THE SCIENCE INTERESTS OF ELEVENTH GRADE STUDENTS IN A SELECTED GEORGIA SCHOOL

A THESIS

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CHAPTER I

INTRODUCTION

Rationale.-- For some time educators have been concerned with the problems involved in dealing with the subjective-objective attitudes, concerns, and/or conditions involved in precept or ideas formation as they influence attention, and their combination in intellectual and feeling consciousness. Rousseau and Pestalozzi are generally regarded as responsible for the doctrine of interest, later stated by Herbart, and espoused by DeGarmo and Dewey. This doctrine holds that the interests of the learner should be considered and utilized in determining both the content and the methods of instruction. In more recent years this doctrine of interest has been associated with the "needs approach" involving recognition of stages of development through which the individual passes in process of becoming mature, and the determination of materials and methods which are suitable for these several stages.

Many answers have been proposed to the questions of "what shall we teach" and "how shall we teach." These tend to reduce themselves to three: a) the vital needs of children/youth; b) society's need to preserve and pass on the social heritage; and c) the current social demands of society. It is believed, however, that a more comprehensive way of answering these questions demands: a) a sound theory of culture and education built from direct study of contemporary civilization; b) dealing with the problems and conflicts of contemporary time and development of an adequate theory of social change; c) understanding and use of the democratic value system; d) acceptance of intelligence and scientific

method; e) building the potential of the society's institutions in terms of their changes; f) recognizing political-social-economic organizational needs; and g) inculcating desire to build the society creatively, imaginatively, and in terms of the intelligent application of science and its method for the democratic growth of man and his society.

Man differs from other animals in only a few ways. Opposition of the thumb to the fingers, migration of the eyes and consequent change in vision and nerve endings, development of symbols and language, and resultant technological advances make it possible for man to use his language and tool-using skills to solve problems, and to create in imagination -- to build and use thought models. Teachers concerned must therefore pattern the responses of pupils into meaningful figures not into isolated piecemeal reactions of skill and fact. In order to do this, the teacher must know that pupils are active, not passive; that pupils create their own meanings through their own responses, not from some hocus-pocus called teaching method or technique. For the unique potentialities and capacities of man are products of his neuro-muscular system which enables humans to relay and delay responses, to make discriminations in perception, to sense and hold direction of thought, to direct thought through perception and relation-seeing, to build thought models, and to generalize from insight and conceptualization.

A basic consideration, then, is that all behavior is directed towards need satisfaction and the most effective way of changing, or inducing a change in behavior is to augment movements towards need-satisfaction. Hence, the foundation of teaching method lies in bio-social psychology, philosophy, and the esthetic orientation of pupils as teachers are aware of these aspects. These postulations are based on the holistic principles of: 1) association; 2) active response; 3) the whole; 4) freedom; 5) anti-

cipatory body response; 6) the perceptual field; 7) thinking-feeling foci; 8) problem solving as a thought process; 9) learning as a creative act.

From the days of the John Dewey Society and its later counterpart, the National Society for the Study of Education,[1] to the more recent publications of the Review of Educational Research, there has emerged an overwhelming amount of literature in support of the principles outlined above, and proposal to teach in these terms.

There are, then, ample bases in the literature for the position that science education should seek not only to make the everyday learning experiences interesting, but also seek to create in pupils abiding interests in science, and its methods, as a way of life and as a method for solving the problems of the democratic society.

Definitions - The Set of Terms.-- There are certain terms which are used extensively within the confines of this study. For the purpose of clarity, these terms are defined as follows:

1. Interest is excitement of feeling, accompanying special attention to some object; concern; also that which causes or holds such interest; power to interest.[2] Interest is not really a power or an entity which generates energy but a sympton. It is in brief,

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1 The following yearbooks of the National Society for the Study of Education, The University of Chicago Press, are especially devoted to these areas: Thirty-third, Part II, The Activity Movement; Thirty-fifth, Part I, The Grouping of Pupils; Thirty-seventh, Part II, The Scientific Movement in Education; Thirty-eighth, Part I, Child Development; Thirty-ninth, Intelligence: Its Nature and Nurture; Forty-first, Philosophies of Education; Forty-third, Adolescence; Forty-fifth, Measurement of Understanding; Forty-sixth, Science Education in American Schools; Fifty-fourth, Adapting Secondary School Program to the Needs of Youth; Fifty-seventh, Integration of Educational Experiences.

2 WNCD, Webster's New Collegiate Dictionary (Springfield: G. and C. Merriam Company, 1957), p. 439.

> a sympton of a favorable adjustment of the worker to his work.[1]
>
> They (interests) indicate pleasure in the activity, and this, according to our analysis, also means relief from some irritant.[2]
>
> Interest is not some one thing; it is a name for the fact that a course of action, an occupation, or pursuit absorbs the powers of an individual in a thorough-going way.[3]

The findings of our review of definitions indicate that the following definition of interest is most acceptable for purposes of this study:

> Interest is a subjective-objective attitude, concern, or condition involving a percept, or an idea in attention, and a combination of intellectual and feeling consciousness; it may be temporary or permanent; it may be based on native capacity, or conditioned by experience.[4]

2. Science refers to those systematically organized bodies of accumulated knowledge concerning the finite universe which have been derived exclusively through techniques of direct objective observation.[5] In this study, it will refer to experiences labeled "science" by eleventh grade students in the Meriweather County Training School, Manchester, Georgia.

The Evolution of the Problem.-- The use of student interest as a springboard to selection of content and teaching methodology is accepted

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1 Arthur I. Gates, Psychology for Students of Education (New York: The Macmillan Company, 1933), p. 452.

2 H. L. Hollingworth, Educational Psychology (New York: D. Appleton Century Company, 1933), p. 441.

3 John Dewey, Interest in Effort in Education (Boston: Houghton Mifflin Company, 1913), p. 65.

4 Carter V. Goode, The Dictionary of Education (New York: McGraw-Hill Company, 1945), p. 223.

5 Sheldon J. Johnson, The Foundations of Science (Detroit: The Hamilton Press, 1957), p. 16.

by many educators. However, acceptance of this notion leaves many unanswered problems, and questions. What, exactly, is student interest? How is it discovered or identified? Can interests be measured? Is interest conditioned by sex, age, intelligence, geographical location? To what extent should interest operate as a determining factor in structuring the course of study?

During a period of several years as a science teacher it was observed that students exhibit varying degrees of interest in science. At the professional level it is increasingly held that science, and developing technology, has large impacts on society. It is also believed that the method of investigation called "scientific method" has implication for solving many of the personal and social problems in the contemporary society.

On the basis of these beliefs, preliminary exploration of the operations involved in using interest as a base for selecting content and method of teaching science led to perusal of literature published in this area. Participation in courses at Atlanta University further sponsored a desire to investigate the implications of an "interests approach" to improving science education.

The specific gap in knowledge, that is the unresolved difficulty encountered, lies in the need to develop precision in detecting and utilizing interest as a basis for selecting content and method. While many efforts have attempted to deal with these questions, more specific application in specific school situations will enable educators to deal more effectively with this approach. There is in addition, a personal desire and need to develop proficiency in this approach by the investigator.

Contribution to Educational Knowledge, Theory or Practice.-- It is believed that the data have the following possible contributions to

education:

1. The study reveals significant and valuable indices of the areas of interest among the students studied, which may become one of the sources for selecting content and pedagogy.
2. The study provides another source for implementation of the "Georgia Science Guide" in a specific teaching-learning situation.
3. The study makes a contribution to the development and improvement of the science program in the school studied.
4. The study provides a base for subsequent studies which may deal with unexplored aspects not dealt with herein.

Statement and Definition of the Problem.-- The basic problem of this study was to attempt to identify the science interests of eleventh grade pupils who are participating in the science education program of the Meriweather County Training School located at Manchester, Georgia. This problem demanded development of an instrument to identify the student's interests. Unsolved problems not dealt with in the proposed study included the extent to which the revealed or identified interests were precisely identified; the extent to which interests are a valid base for selecting content and method; development of techniques for evaluating specific interests; and production of materials specifically designed to satisfy student interest. These, and other problems remain to be solved in this area of scientific investigation, and are specified and proposals for subsequent research explicated in the final chapter of the thesis.

Ultimate Objectives or Purposes of the Study.-- Two interrelated major purposes conditioned the research: (1) Is the testimony of pupils consistent or is it evanescent and changeable? Are the responses studied

and reliable, or do they represent "snap judgments?" (2) What are some of the factors in the situation which may predispose to the realization of divergent results? More specifically and corrolary propositions included the following purposes:

1. Are the results obtained significantly affected by the form of the item; for example, a tendency to select or reject items containing "salesmanship" terms or items stated in question form?
2. Are the items selected materially conditioned by the comparative word-difficulty of the items offered for selection?
3. Are "categories" of "interest" or relationship recognizable?
4. Are the sex and age differences reported by other studies observable?

It is recognized that other analyses might have been made. However, the present study was limited to the foregoing considerations.

The Research Procedure or Operational Steps.-- The following steps were used in conducting this research:

1. The first step was to construct item-lists which were suggestive of the materials of science at least in one or more of their usages. These items were related to phases of science and to the Thorndike list of 30,000 words utilized to develop a basic vocabulary.[1]

   a) Operation one - The Taxonomy of Educational Objectives[2] was

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[1] Edward L. Thorndike and Irving Lorge, Teachers Word Book of 30,000 Words (New York: Bureau of Publications, Teachers College, Columbia University, 1944).

[2] Benjamin S. Bloom et al., Taxonomy of Educational Objectives (Prelimary ed.; New York: Longman's Green and Company, 1954), p. 175.

consulted.

b) Questions and Problems in Science: Test Item Folio No. 1 was used to build the instrument for identifying interests.[1]

c) The items, when compiled, were assembled into a single column using the Dressel-Nelson subject headings (30 headings) in the biological and the physical sciences (each of the items in the Dressel-Nelson listing is related to the Bloom Taxonomy).[2]

2. The second step involved preparation of terms or phrases which were matched either as synonyms or for implications. For purpose of example, the following is presented:

Column I	Column II
2. breathing	respiration
5. toxins	antitoxins
6. oceans	seas
8. climate	seasons
9. energy	power

Such grouping provided the basis for studying consistency of response.

3. The third step involved preparation of items as questions in which the students were interested, and these were matched with the items in the first and second columns. This gave indication of whether or not the question or problem form of item intro-

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[1] Paul Dressel and Clarence Nelson, Questions and Problems in Science (Princeton: Educational Testing Service, 1957), pp. 75, 81: 90-120.

[2] Clarence H. Nelson, Let's Build Quality Into Our Science Tests (Washington: National Science Teachers Association, National Education Association, 1958), p. 13.

duced a conditioning factor into the situation. (Effort to eliminate other conditioning factors consisted of using the Thorndike words in structuring the statements). Example:

Column I	Column II	Column III
2. breathing	respiration	How do we breathe?
5. toxins	antitoxins	Are toxins dangerous?
6. oceans	seas	How deep are seas?
8. climate	seasons	What causes changes in climate?
9. energy	power	From what sources do we obtain power?

4. A fourth step consisted of preparing items incorporating "salesmanship" terms such as "dangers," "romance," "value," and the like. This was done to see if "naivete" was a conditioning factor. These items were matched to the other items. Example:

Column I	Column II	Column III	Column IV
2. breathing	respiration	How do we breathe?	The mystery of breathing
5. toxins	antitoxins	Are toxins dangerous?	Interesting facts about toxins
6. oceans	seas	How deep are seas?	The mysteries of seas
8. climate	seasons	What causes changes in climate?	The romance of the seasons
9. energy	power	From what sources do we obtain power?	Strange facts about energy

5. The fifth step consisted of assembling the items into four final forms, after submission to a "jury" consisting of out-

standing science educators and other "experts." The items were then "scrambled" horizonally across the columns. A master list of "scrambled matched items" was prepared, utilising a "staggering" process. Thus, item 1, Column 1 (original designation) might become item 79, Form IV, et cetera. Each final form contained equal numbers of items from each of the original columns. Also, each item was represented in one of its four forms in each of the item lists.[1]

6. The sixth step proposed to present the four forms to the students within a period of eight weeks. This allowed a lapse of two weeks after administration of each form. Directions were identical on all item-lists. All testimony with respect to each item was recorded on specially designed data sheets, and scored.

7. The seventh step involved analysis for:

   a) Consistency of individual responses over a two month period on identical items

   b) Individual consistency at thirty minute intervals

   c) Group testimony regarding preference

   d) Shifting of testimony

   e) Factors influencing testimony according to:

      (1) Type of item

      (2) Sex

      (3) Word difficulty

      (4) Categories of interest

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[1] The forms of the "Inventories" contained in the appendix are the comparative forms and not those presented to students for response.

8. The eighth step involved re-definition of the basic term "interest" and hypothesizing on whether student testimony represented a "valid" expression of their interests.
9. The ninth step consisted of generalization as to whether or not there were entities of symptoms of interest, the extent to which pupil testimony (and the factors influencing interest or testimony) might be utilized in determining a course of study in secondary school science.
10. The tenth step consisted of efforts to summarize, reach conclusions, generalizations, implications, recommendations and the like from the collected data. These are presented in the final chapter of the thesis. The findings are preceeded by the survey of the pertinent literature, which forms the base upon which the study rests.

Locale of the Study.— The study was conducted in the Meriweather County Training School, Manchester, Georgia during the second semester of the 1958-1959 school term. The subjects involved were the eleventh grade pupils enrolled in this school.

Survey of the Pertinent Literature.— The literature reviewed was organized under two major captions: (1) literature pertaining to the philosophy and objectives of science education; and (2) literature pertaining to research on science interests.

Objectives and Philosophy of Science Education

Weaver indicates that four distinct epochs have emerged in the teaching of science. These are: (1) the taxonomic, based on mental discipline and faculty psychology in which the emphasis is upon recognizing, classifying, and memorizing the individual facts of science; (2) the

static-descriptive, based on early behavioristic psychology, in which the objectives dealt with static and morphological forms, still with emphasis on memorization and mastery of content; (3) the dynamic or analytical, based on dynamic psychology, in which an effort is made to "fuse" and "blend" chemistry, physics, and/or biology; and (4) the holistic based on organismic and field theories of psychology, in which a unitary approach to all phenomena is made, with the main emphasis on inter-relationships and interdependencies of matter, energy, and change, and the evolution of an ecological view of all the phenomena in the universe.[1]

Bernal lends additional thought to this point of view by stating two specific objectives of science:

> The first objective is to provide enought understanding of the place of science in society to enable the great majority that will not be actively engaged in scientific pursuits to collaborate intelligently with those who are, and to be able to criticize or appreciate the effect of science on society. The second objective, which is not entirely distinct is to give a practical understanding of the scientific method, sufficient to be applicable to the problems which the citizen has to face in his individual and social life.[2]

In the Forty-sixth Yearbook of the National Educational Association, a basic philosophy for science was proposed:

> Science is today on a plane of high significance and importance. It is no longer, if indeed it ever was, a mysterious and occult hocus-pocus to be known only to al select few. It touches, influences, and molds the lives of every living thing. Science teachers have the great opportunity and responsibility to make a large contribution to the welfare and advancement of humanity. The intellectual aspects of this responsibility are at least co-equal in importance with the material. Science is a great social force as well as a method of investigation. The understand-

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[1] Edward K. Weaver, "Science and the Curriculum, School Science and Mathematics, LIX, No. 6 (February, 1959), p. 354.

[2] J. D. Bernal, "Science Teaching in General Education," Science and Society, IV, No. 1 (January, 1940), pp. 2-4.

> ing and acceptance of these facts will, more than anything else, make science teaching what it can and should be.[1]

There have been many general surveys in the field which have resulted in statements concerning the objectives and philosophy of science. These include reports from the Educational Policies Commission,[2] Harvard University,[3] The Commission on Reorganization of Secondary Education,[4] Science in General Education,[5] The American Council of Science Teachers,[6] and the National Committee on Science Teaching.[7] These reports generally agree on the basic objectives and philosophy in terms of: (a) functional information or facts; (b) functional concepts; (c) functional understandings; (d) instrumental skills; (e) problem-solving skills and abilities; (f) attitudes; (g) appreciations; and (h) interests.

The literature is generally agreed that science educators have come to think that the more important things to aim at in science courses are such things as understanding what science is about and knowing how scien-

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1 Science Education in American Schools, Forty-sixth Yearbook of the National Society for the Study of Education, Part I (Bloomington, Ill.: Public School Publishing Company, 1947), p. 39.

2 Educational Policies Commission, Education for All American Youth (Washington: National Education Association, 1944).

3 General Education in a Free Society (Cambridge: Harvard University Press, 1945), p. 155.

4 Report of the Commission on Reorganization of Secondary Education - The Subcommittee on the Teaching of Science, Bulletin No. 36 (Washington: U. S. Bureau of Printing, Office of Education).

5 Science in General Education (New York: D. Appleton Century, 1938).

6 The Education of the Science Teacher, A Report of the National Committee on Science Teaching, The American Council on Education, and the National Education Association (Washington, 1942).

7 Redirecting Science Teaching in the Light of Personal-Social Needs, A Report of the National Committee on Science Teaching (Washington: National Education Association, 1942).

tists go about their work, rather than material knowledge alone. The goal of showing what science is, what scientific procedure is like, and what scientists are like is now seen to be the most real, and perhaps the most important thing, in science education.[1]

Research on Science Interests

Many studies of the science interests of children have been made in an attempt to formulate valid guides for the selection of content. Among these are the studies made by Mau,[2] Downing,[3] Trafton,[4] Finley,[5] Palmer,[6] and Zim.[7] The National Society for the Study of Education[8] proposed among other things, that the program of science through grades one to twelve be directed toward meaning for a selected group of concepts or major generalizations of science. Gerald S. Craig developed the technique and determined a group of these concepts, and proposed that children's interests form one basis for selecting those which would be dealt with. He further emphasizes

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1 Science Education in American Schools, op. cit., p. 4.

2 Laura M. Mau, "Some Experiments With Regard to the Relative Interest of Children in Physical and Biological Nature Materials," Nature Study Review (July, 1912).

3 Elliott Downing, "Children's Interests in Nature Materials," Nature Study Review (January, 1912).

4 G. H. Trafton, "Children's Interests in Nature Materials," Nature Study Review (September, 1913).

5 C. W. Finley, "Some Studies of Children's Interests in Science Materials," School Science and Mathematics (January, 1921).

6 E. L. Palmer, "How to Meet Some of Children's Nature Interests," Nature Study Review (February, 1922).

7. Herbert S. Zim, "Science Interests and Activities of Adolescents," Teachers College Record (New York: Columbia University Press, 1940).

8 A Program for Teaching Science, Thirty-first Yearbook of the National Society for the Study of Education, Part I (Bloomington, Ill.: Public School Publishing Company, 1932).

that the studies of children's interests reveal the challenge that comes from the interpretation of natural phenomena. The wise teacher will use these interests.[1]

The Commission on the Reorganization of Science in Secondary Schools stated that the particular units of study should be those that truly interest the pupils.[2] Curtis lends support to this fact by saying:

> ...Those statements most widely applicable in life and most generally challenging to the interests of children should receive most consideration in the curriculum....[3]

The studies on interests in science are so numerous that for the purpose of this thesis they may be summarized and cited here. These include the Washburne,[4] Pollock,[5] Curtis,[6] Thompson-Inman Kane,[7] and DeWitt Clinton studies.[9]

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1 Gerald S. Craig, "Certain Techniques Used in Developing a Course of Study in Science for the Horace Mann Elementary School," Contributions to Education, No. 276 (New York: Bureau of Publications, Teachers College, Columbia University, 1927), p. 30

2 National Society for the Study of Education, op. cit., p. 205

3 Francis D. Curtis, "A Study of the Scientific Interests of Dwellers in Small Towns and in the Country," Peabody Journal of Education, V (July, 1927), pp. 23-24.

4 Carleton W. Washburne, Scientific Method in the Construction of School Textbooks (Yonkers-on-Hudson: World Book Company, 1939).

5 C. A. Pollock, "Children's Interests as a Basis of What to Teach in General Science," Ohio State University Educational Research Bulletin, III, No. 1 (January 9, 1924), pp. 3-6.

6 Francis D. Curtis, "Some Values Derived from Extensive Reading of General Science," Contributions to Education (New York: Bureau of Publications, Teachers College, Columbia University, 1924), pp. 22-34.

7 Vide., George W. Hunter, Science Teaching (New York: American Book Company, 1934), pp. 68-70.

8 Hunter, loc. cit., p. 66.

9 Hunter, loc. cit., pp. 71-79.

Perhaps the most definitive of these studies was that conducted by Fitzpatrick who concluded:

> General educators have recommended pupil "interest" as a criterion of what should be included in courses of study . . . . However, it seems necessary . . . that general educators furnish us with adequate directions about how these interests are to be determined.[1]

Summary.-- The studies on objectives and philosophy of science education and of interest as a guide in the formulation of courses of study lead to the conclusion that there is need for continued study of the relation between pupil testimony to objectives of science education as an adequate index for determining the materials and methods of teaching science, and for attaining the objectives which have been agreed upon.

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[1] Frederick Linder Fitzpatrick, Science Interests (New York: Bureau of Publications, Teachers College, Columbia University, 1936).

CHAPTER II

ANALYSIS AND INTERPRETATION OF THE DATA

This chapter will present, analyze, and interpret the data gathered through administration of the four interest Inventories to the 33 eleventh grade science students who constituted the subjects of this study. The data are organized and presented as follows: 1) the word count of the basic inventory; 2) the subjects responses to the Inventories as a group; 3) response patterns by age and by sex; 4) individual analysis of responses for consistency; and 5) evidences of shifting of testimony.

1. Word count (Word Difficulty) of the basic Inventory

A basic inventory of science words or phases was structured by using a formula developed by Clarence Nelson for the "Two-Axis Chart of Specifications for a Final Examination in Natural Science."[1] This chart was based on Taxonomy of Educational Objectives so that it was then possible to apply the Nelson formula and build an interest inventory by selecting items from the "Questions and Problems in Science" Test Folio which Dressel and Nelson developed for use with the Taxonomy.[2]

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[1]Clarence H. Nelson, Let's Build Quality Into Our Science Tests (Washington: National Science Teachers Association, National Education Association, 1958), p. 13.

[2]Paul Dressel and Clarence Nelson, Questions and Problems in Science (Princeton: Educational Testing Service, 1957), p. 175.

After the test-items (interest items) were developed they were then subjected to analysis by means of The Teachers Word Book of 30,000 words. Part 1 of the Word Book was utilized, comprising a basic list of 15,000 words. This part presents several counts of words occuring at least once per one million words. Part 1 is a list of words which followed by a record of the frequency of occurence of the word in general, and in four other different sets of reading matter.

Table 1 presents the listings of word difficulty of the words used in the basic interest inventory. Only the basic inventory list is presented here,,since the other listing represented synonyms of the basic listing and have approximately or similar counts. In the first column of Table 1, after the word, is a number stating the occurences per million words. One equals at least one occurence per million and not so many as two per million; two equal at least two per million and not so many as three per million; and similarly up to 49; "A" equals at least 50 per million and not so many as 100 or over per million. The other four columns of Table 1 present the number of occurences in approximately 4½ million words and are identified as T (the Thorndike general count of 1931 L (the Lorge magazine count) J (the Thorndike count of 120 juvenile books) and S (the Lorge-Thorndike semantic count). It will be noted, therefore, that there are five counts identified in this Table, a G or general count, and the T,L,J, and S counts. This provides a basis for abstraction of certain words and to identify the extent to which the words were within the vocabulary range of these 11th grade students

The numbers under T are computations from the Thorndike 1931 data. An M in the T column means that the word was one of the 500 commonest

TABLE 1

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
	AA	M	448	?	770
1. Earth's Axis	9	57	4	31	85
2. Evaporation	5	50	15	3	26
3. Erosion	2	18	7	8	11
4. Longitude	5	57	4	13	25
5. Vertebrates	1	18	3	2	6
6. Molds	22	50	206	91	65
7. Competition among Animals and Plants	28	57	163	25	268
	AA	700	377	700	849
	AA	M	944	M	M
8. Symbiosis	(Not Listed)				
9. Food	AA	M	M	M	?
10. Heidelberg Man	1	7	12	6	10
11. Climate	41	230	127	187	203

TABLE 1

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
12. Condensation	3	28	11	6	21
13. Glaciers	8	57	5	32	50
14. Latitude	12	57	12	34	115
15. Invertebrates	1	12	1	2	5
16. Fungi	1	11	4	4	5
17. Malthus and Overpopulation	2	0	0	0	36
18. The Food Chain	AA	M	M	M	?
	A	700	175	374	248
19. Birth-Death Rates	A	320	255	320	281
	AA	M	815	410	?
	AA	410	388	?	686
20. Java-Man	3	18	18	3	30
	AA	M	M	M	M
21. Horizon	20	115	76	75	102
22. Igneous	1	3	1	19	11

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
23. Valcanoes	14	57	22	101	77
24. Streams- Revers	AA	700	285	700	656
	AA	M	455	M	M
25. Birds	AA	M	386	M	348
26. Mosses	22	160	64	128	46
27. Artificial Selection	20	76	93	52	145
	17	57	131	39	93
28. Recessive genes	1	16	2	0	0
29. Survival of the Species	4	18	18	4	32
	15	57	58	161	2
30. Peking-Man	AA	M	M	M	M
31. Revolution of the Earth	A	130	158	138	484
	AA	M	448	?	No
32. Sedimentary Rock	1	4	2	10	7
	AA	M	509	?	678

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
33. Weathering	AA	696	403	491	379
34. Atmospheric Conditions	5	7	17	15	52
	AA	700	855	700	M
35. Mammals	6	50	6	35	21
36. Yeast	7	57	49	4	22
37. Imbreeding	5	30	33	20	27
38. Sex-Linked Characters	26	115	180	27	155
	24	160	103	62	116
	AA	390	522	390	M
39. Natural Selection	AA	700	599	640	680
	17	57	131	39	93
40. Inheritance of Skin-Color	11	90	27	31	62
	AA	700	588	482	264
	AA	M	M	M	958
41. Rotation of the Earth	7	57	8	16	54
	9	57	4	31	85
42. Metamorphic Rock	4	50	6	15	13
	AA	M	509	?	678

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
43. Durability of Land Features	1 A	10 240	14 422	0 240	8 546
44. Peninsulars	2	4	1	5	33
45. Reptiles	8	50	14	49	34
46. Bryophytes			(Not Listed)		
47. Adaptation in Plants and Animals	6 AA AA	50 M 700	19 944 337	3 M 700	39 M 849
48. Hybrids	5	50	35	1	4
49. Common Ancestors of man	AA 22	700 130	568 66	857 94	M 166
50. Euthenics			(Not listed)		
51. Biotic Potentials	5 8	57 23	12 43	4 1	8 82
52. Inheritance of Hair - Texture	11 AA 6	90 M 28	27 M 55	31 M 19	62 242 21

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
53. Gravity	14	57	35	61	112
54. Cleavage of Rock	3	8	23	28	23
	AA	M	509	?	678
55. Sand Dunes	A	700	200	415	344
	3	28	13	5	12
56. Coastal Region	2	14	6	1	24
	A	400	149	400	788
57. Fish	AA	700	597	700	482
58. Monocatylendons			(Not listed)		
59. Modification of Inherited Characters	7	14	16	10	101
	19	130	90	40	83
	AA	390	522	390	M
60. Domestication of animals and plants	2	14	4	13	21
	AA	700	377	700	849
	AA	M	944	M	M
61. Sterilization	1	4	0	0	25

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
62. Inheritance of intelligence	11 32	90 130	27 144	31 91	62 215
63. The Seasons	AA	695	627	597	497
64. Boulders	5	16	13	38	40
65. Mountain formation	AA 19	M 57	288 44	? 69	M 86
66. Magma					
67. The plant and animal phyla	AA AA	M 700	944 377	M 700	M 849
68. The Conifers	1	11	2	0	6
69. Parasitism	5	59	16	3	29
70. The predators	2	10	11	8	13
71. Twins-Triplets-Quardruplets-Quintriplet	25 1 1	200 50 11	100 18 4	114 6 1	41 34 8

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
72. The Sun	AA	M	603	M	M
73. Minerals	38	115	48	374	148
74. Rivers and their works	AA AA	M M	455 M	M M	M M
75. Earth fractures	AA 7	M 28	448 26	? 20	770 54
76. Respiration	4	57	2	7	19
77. Stomata			(Not Listed)		
78. Ecology			(Not Listed)		
79. Mimicry	1	10	4	3	2
80. Eugenics			(Not Listed)		
81. Fossils	6	57	10	26	26
82. Copernicus			(Not Listed)		
83. Animals and plants remains	AA AA AA	700 M M	377 944 867	700 M M	849 M M

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
84. Loess			(Not listed)		
85. Islands	AA	700	395	700	M
86. Digestion	6	57	29	13	20
87. Thallaphytes			(Not listed)		
88. Saprophytes			(Not listed)		
89. The influence of the environment	A 13	250 57	377 91	250 13	864 89
90. Population Curves	A 36	220 160	230 202	220 122	868 177
91. Caucasians	1	10	5	4	14
92. Origins of the Earth	28 AA	90 M	62 448	75 ?	278 770
93. Diastraphism			(Now listed)		
94. Earth quakes	15	115	29	52	91
95. Meridian and Time	5 AA	57 M	3 M	13 M	30 M

TABLE I

WORD DIFFICULTY

Items	Classification of Words				
	G	T	L	J	S
96. Pteridaphytes			Not listed		
97. Homology			Not listed		
98. Negroes	47	230	174	230	225
99. Survival of the Fittest	4	18	18	4	32
100. Health	AA	700	591	576	436

by the Thorndike count, and occurred from 800 to 100,000 or more times per 4½ million words. An M in the L column means that the word occurred 1,000 times or more in the Lorge magazine count. An "M" in the "J" column means that the word occurred 1,000 times or more in the count of 120 juvenile books; and "M*" in the "S" column means that it probably did. "M" and "M*" in the "S" column means that the word had 1,000 times or more occurrences in the semantic count, surely (M) or by estimate (M*). The starred numbers in the "J" column are estimates made by the authors. In some cases where the number of occurrences per million depends upon extremely frequent use of the word in one of the counts, it is followed by a question mark.

The words listed in Table 1 were analyzed to include all words with a total of 18 or more occurrences in the four columns, except that certain rare contractions, proper names, some foreign words, and slang words are not in the Word Book. The authors therefore avoided cluttering up the list with words of almost no importance and of questionable frequency. The words marked "AA" are approximately the first thousand in frequency. The words marked "A" are approximately the second thousand. The words marked as 49-30 are approximately the third thousand; those marked 29-19 are approximately the fourth thousand; those marked 18-14 are approximately the fifth thousand; those marked 13-10 are the sixth thousand; those marked 9 or 8 are the seventh thousand; bringing the total for "AA" down through 8 to 7,055. Those marked 7, 6, 5, or 4 bring the total somewhat past 10,285.

This Table, then, tells us whether the words used in the Inventory are in standard English reading matter. The first number in the Table is a summary from all four counts. The numbers in the T,L.J and S columns,

however, have great value in certain cases. The "T" count emphasizes frequency in readers, textbooks, the Bible, and the English classics; the "L" counts included recent and popular magazines; the "J" counts included books recommended for boys and girls in grades three and eight; and the "S" counts used a miscellaneous of juvenile and adult reading. It is expected that 11th graders should deal with a "G-3" or lower count.

It should be indicated, also, that the Lorge-Thorndike procedures propose that pupils should know the "G" meaning of the words down through "4" by the end of grade 10, and down through "3" by the end of grade 11. The Inventories were administered to 11th grade pupils during the Spring semester, latter half, and therefore this group should normally be expected to deal with words which were "G" counts of 2 or less. Actually, this means that, for our purposes, only words with "G-1" or "G-2" count may have been too difficult for this group.

Words with a "G-1" or "2" count in the basic inventory were: Verbebrates, Heidelberg Man, Invertebrates, Fungi, Malthus, Igneous Recessive, Sedimentary, Durability, Peninsulas, Coastal, Sterlization, Conifers, Mimicry, Caucasian. It may be observed, however, that each of these words appear in the T, L, J, and S counts, and are therefore in the basic Thorndike listings, the magazines, the juvenile books, and the semantic counts. In addition, the writer specifically had instructed the pupils in these areas and, consequently, these words were within the vocabularies of the subjects due to their usage in the everyday science classroom activities.

On these bases, therefore, it is concluded that the words were within the pupils range, and that the Inventories could be dealt with by these subjects. All of the words were within the first 15,000 words which occur most frequently. Students in the 11th grade are expected to have

at least a basic vocabulary of this size.

2. Group Responses to the Inventories.

The first step in making up the item-lists was to select one hundred terms suggestive of the materials of science, at least in one or more of their usages as proposed by Dressel and Nelson and Taxonomy. Ten categories of natural science content were identified: Category I dealt with the methods of science; Category II minerals and rocks; Category III changes in land features; Category IV interpretation of land features; Category V animal classification; Category VI the Plants of the earth; Category VII populations andthe mechanisms of evolution; Category VIII Variation and Selection; Category IX Facts of Evolution and the Theory that Explains Them; and Category X Evolution, Genetics, and the Races of Man.

These ten groups of items, hereinafter referred to as Category 1, 2, and so on, are not mutually exclusive as science increasingly moves towards a univied area. Thus, it will be observed that certain items are identifiable in various categories. The basic listing of items by categories follows; as in Table 2 Categories of the Item Lists.

A second column of terms or phases was then prepared. Each item in this column was "matched" with the corresponding item in the first column. In some cases the paired items were synonyms; in all cases the pairs related in their implications. Webster's Book of Synonyms was used for this purpose.[1] This grouping provided the basis for studying consistency of response. A third column was prepared in which all items were arranged in the form of questions. These were selected to match

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[1] Websters New Collegiate Dictionary. G. and C. Merriam Company, Springfield, Mass. (1953).

TABLE 2

Categories	Areas				Total
	Knowledge	Comprehansion (translation interpretation extrapolation)	Application	Analysis	
I. Methods of Science; Hypothesis, concerning the Origin of the Solar System	5	2		3	10
II. Minerals and Rocks	5	5			10
III. Changes in Land Features	4	4	2		10
IV. Interpretation of Land Features	2	2	6		10
V. Annimal Classification	2	4	4		10
VI. The Plants of the Earth	4	4	2		10
VII. Populations and the Mechanisms of Evolution	3	3		4	10
VIII. Variation and Selection		1	5	4	10
IX. Facts of Evolution and the Theory that Explains them		2	2	6	10
X. Evolution, Genetics and the Races of Men		3	4	3	10
Total	25	30	25	20	100

Based on Taxonomy of Educational Objectives, published by Longmore, Green and Co., New York, 1954.

the first and second columns. It was hoped that responses to the third column type of item would give some indication of whether or not the question or "problem" form of item introduced a conditioning factor into the situation. Also other conditioning factors, such as connotations attached to words, were also important in these situations. A fourth column was prepared consisting of items which incorporated "salesmanship" terms. While some of these terms appear naive in their implications, this naivete was regarded as a conditioning factor and had been so treated in some of the previous studies.

It will be observed that the four inventories include 400 items "matched" in serial order in this presentation. Every word used in any column of either of the Inventories appears in the Thorndike list of the 15,000 words, and the vast majority are from the 10,000 words employed most frequently in texts, children's literature, magazines, and in common usage.

Tables 3, 4, 5, and 6 present the group's responses from each item, the inventory list according to an "Interested," "Very Interested," "Not Interested" and "Don't Care" scale of values. Since 100% responses from each inventory was secured, totals are not identified in these tables. The inventories were secured, totals are not identified in these tables. The inventories were administered at one week intervals for a period of five weeks; hence, the tables respresent responses at one week intervals.

After the group responses were identified (Tables III-VI), it was agreed that it would be useful to combine the "Interested" and "Very Interested" responses and rank these responses by inventories. Table VII presents this data.

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
1. Earth and Axis	24	2	6	1	33
2. Evaporation	25	4	3	1	33
3. Erosion	17	5	11	0	33
4. Rongitude	19	2	7	5	33
5. Vertebrates	16	13	3	1	33
6. Molds	13	0	14	6	33
7. Competition among animals and plants	10	15	6	2	33
8. Symboesis	15	1	12	5	33
9. Food	5	27	1	0	33
10. Heidelberg man	20	2	6	5	33
11. Climate	22	9	2	0	33
12. Condensation	26	1	4	2	33
13. Glaciers	22	0	9	2	33
14. Lotitude	20	1	10	2	33

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
15. Invertebrates	15	10	8	0	33
16. Fungi	21	2	9	1	33
17. Malthus & over population	24	0	5	4	33
18. The food chain	24	6	3	0	33
19. Birth - Death Rates	18	12	1	2	33
20. Java - Man	16	6	7	4	33
21. Horizon	23	0	9	1	33
22. Ingneous	16	0	14	3	33
23. Volcanoes	20	3	7	3	33
24. Streams-rivers	13	2	15	3	33
25. Birds	20	8	2	3	33
26. Messes	20	1	7	5	33
27. Artificial selection	19	1	9	4	33
28. Recessive genes	16	1	12	4	33
29. Survival of the species	16	5	11	1	33

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
30. Peking - man	23	1	7	2	33
31. Revolution of the Earth	24	7	2	0	33
32. Sedimentary Rock	16	1	11	5	33
33. Weathering	25	1	6	1	33
34. Atmospheric Conditions	23	4	6	0	33
35. Mammals	16	10	7	0	33
36. Yeast	15	1	13	4	33
37. Inbreeding	18	3	10	2	33
38. Sex-linked characters	11	20	2	0	33
39. Natural selection	22	3	6	2	33
40. Inheritance of skin color	16	15	1	1	33
41. Rotation of Earth	26	4	3	0	33
42. Metamorphic Rock	14	1	15	3	33
43. Durability of Land features	20	1	10	2	33

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
44. Peninsulars	18	0	14	1	33
45. Reptiles	18	6	14	2	33
46. Bryophytes	16	1	14	2	33
47. Adaptation in Plants & Animals	21	6	6	0	33
48. Hybrids	17	3	10	3	33
49. Common Ancestors of Man	17	13	3	0	33
50. Euthenics	15	0	15	3	33
51. Biotic Potentials	15	1	15	2	33
52. Inheritance of Hair Texture	23	7	3	0	33
53. Gravity	23	4	6	0	33
54. Cleavage of Rocks	16	1	11	5	33
55. Sand Dunes	19	0	11	3	33
56. Coastal Regions	21	2	8	2	33
57. Fish	22	5	5	1	33

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
58. Monocotyledons	17	2	12	2	33
59. Modification of Inherited Characteristics	24	2	6	1	33
60. Domestication of Animals & Plants	24	3	6	0	33
61. Sterilization	22	6	4	1	33
62. Inheritance of Intelligence	14	17	2	0	33
63. The Seasons	23	6	3	1	33
64. Boulders	18	0	12	3	33
65. Mountain Formation	20	5	8	0	33
66. Magma	16	1	13	3	33
67. The Plant & Animal Phyla	17	2	10	4	33
68. The Conifers	17	2	10	4	33
69. Parasitism	24	1	6	3	33
70. The Predators	19	0	9	5	33
71. Twin-triplets, etc.	16	13	2	2	33

TABLE 3

GROUP TESTIMONY - INVENTORY 1

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
72. The Sun	23	10	0	0	33
73. Minerals	24	7	2	0	33
74. Rivers & Their Work	24	2	5	2	33
75. Earth Fractures	23	4	5	1	33
76. Respiration	23	9	1	0	33
77 Stomata	22	3	5	3	33
78. Ecology	25	3	5	0	33
79. Mimicry	22	1	6	4	33
80. Eugenics	20	2	8	3	33
81. Fossils	23	5	4	1	33
82. Copernicus	19	2	8	4	33
83. Animal & Plants Remains	21	4	6	2	33
84. Loess	13	2	14	4	33
85. Islands	16	6	9	2	33
86. Digestion	19	12	2	0	33

TABLE 3

GROUP TESTIMONY - INVENTORY I

Items	Interested	Very Interested	Not Interested	" Don't Care"	Total
87. Thallophytes	21	6	5	1	33
88. Sophrophytes	19	4	7	3	33
89. The Influence of Environment	22	6	4	1	33
90. Population Curves	24	4	4	1	33
91. Caucasians	11	3	11	8	33
92. Origin of the Earth	23	3	6	1	33
93. Diastrophism	20	1	10	2	33
94. Earthquakes	19	7	5	2	33
95. Meridian and Time	23	3	6	1	33
96. Pteridosphytes	22	0	10	1	33
97. Homology	26	2	5	0	33
98. Negroes	2	31	0	0	33
99. Survival of the Fittest	21	3	7	2	33
100. Health	5	27	1	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
1. World's Base	23	7	3	0	33
2. Dehydration	23	2	8	0	33
3. Deterioration	25	0	8	0	23
4. Mileage	23	3	6	1	33
5. Backbone	20	11	2	0	33
6. Mildew	20	4	8	1	33
7. Rival Between Beast and Herbs	25	3	5	0	33
8. Sembiotic Relations	25	4	4	0	33
9. Eats	20	13	0	0	33
10. Pre-Historic Man	19	12	0	2	33
11. Weather	27	5	1	0	33
12. Shrinking	20	3	8	2	33
13. Ice	24	3	5	1	33
14. Diameter	24	2	5	2	33
15. Without Backbone	24	7	2	0	33
16. Bacteria and Economist	20	11	2	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
17. Political Economist and Increase in Birth-rates	19	11	1	2	33
18. Chow Train	20	1	11	1	33
19. Childbirth - Decrease Tax	23	8	2	0	33
20. Human Remains of Molay	18	8	5	1	33
21. Range	20	1	11	1	33
22. Heat Formed Rocks	25	2	6	0	33
23. Mountains	23	3	6	1	33
24. Currents - Rapids	26	0	5	2	33
25. Fowls of the Air	24	5	4	0	33
26. Parasitic Fungi	21	5	7	0	33
27. Synthetic Preference	21	0	11	1	33
28. Receded Heritage	23	3	7	0	33
29. Remains of the Class	23	5	5	0	33
30. Human Fossils of China	20	5	6	1	33
31. Rotations of the Universe	17	11	41	1	33
32. Residue Stones	22	2	9	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
33. Tornados	21	8	4	0	33
34. Air Situations	24	6	3	0	33
35. Feast	27	1	5	0	33
36. Ferment	21	2	10	0	33
37. Breeding Within	22	9	2	0	33
38. Male Connected Symbols	22	8	3	0	33
39. Inartificial Choice	22	2	8	1	33
40. Heritage of Hide Tint	22	3	8	0	33
41. Turning of the Satellite	20	10	3	0	33
42. Transformating Stones	21	2	10	0	33
43. Permanent Share Scene	23	2	8	0	33
44. Continents	24	3	6	0	33
45. Snakes	16	9	8	0	33
46. Trees	23	7	3	0	33
47. Adjustment of Shrubs and Beast	20	5	6	2	33
48. Mixtures	24	6	3	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
49. General Forefathers of Human Race	17	14	2	0	33
50. Improvements	17	14	2	0	33
51. Life Dormant	23	7	3	0	33
52. Heritage of Hornylike Threads	21	2	10	0	33
53. Force	29	3	1	0	33
54. Anatomy of Stones	20	1	10	2	33
55. Desert Mounds	26	0	6	1	33
56. Beach Region	24	3	6	0	33
57. Aquatic Animals	27	3	3	0	33
58. Seed Plants	24	2	7	0	33
59. Variation of Heredity Symbols	22	2	8	1	33
60. Taming of Beast & Shrubs	24	6	3	0	33
61. Birthright	19	9	5	0	33
62. Alternation	27	0	6	0	33
63. Roundness	20	0	12	1	33
64. Volcanic Erection	25	2	6	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
65. Lava	26	4	3	0	33
66. Vegetable and Beast Division	21	8	4	0	33
67. Cone Bearing Plants	22	3	8	0	33
68. Leach	22	3	8	0	33
69. Kidnappers	15	12	5	1	33
70. Couples, Trios, Quartets, Cinques	13	17	1	2	33
71. Center of the Universe	24	6	3	0	33
72. Minerology	24	4	5	0	33
73. Running Water and its Labor	27	2	4	0	33
74. World Fissures	24	6	2	1	33
75. Breathing	20	11	2	0	33
76. Classification	25	6	2	0	33
77. Mutual Relations	21	4	8	0	33
78. Mockery	20	3	9	1	33
79. Betterment	23	3	7	0	33
80. Remains	26	2	4	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	Total
81. Beast and Vegetables Residue	22 a	6	5	0	33
82. Clay	16	2	14	1	33
83. Islet	19	1	13	0	33
84. Absorption	22	3	8	0	33
85. Fungi Plants	24	5	4	0	33
86. Mushrooms	18	4	11	0	33
87. The Effect of the Background	18	8	6	1	33
88. Generation Arch	21	5	6	1	33
89. Classes of Peoples	15	15	3	0	33
90. Beginning of the Universe	23	9	1	0	33
91. Deformed Earth	25	4	4	0	33
92. Tremble of the Earth	29	3	1	0	33
93. Region and Opportunity	26	3	4	0	33
94. Flowerless Plants	23	4	6	0	33
95. Equality	26	2	5	0	33
96. Free of Germs	19	12	2	0	33

TABLE 4

GROUP TESTIMONY - INVENTORY II

Item	Interested	Very Interested	Not Interested	"Don't Care"	TOtal
97. Revolution of Plants	19	8	6	0	33
98. Ebony	19	5	8	1	33
99. Remains of the Adaptable	23	6	4	0	33
100. Hearty	25	7	1	0	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care	Total
1. What planets are in our Solar System?	24	9	0	0	33
2. What causes evaporation?	26	4	2	1	33
3. How does running water affect the soil?	27	3	3	0	33
4. How is distance measured?	29	2	2	0	33
5. What are some vertebrate animals?	23	9	1	0	33
6. What causes molds?	25	2	6	0	33
7. Do organisms have the urge to live?	25	6	2	0	33
8. What is mutual relations?	25	3	5	0	33
9. What is a correct diet?	22	9	2	0	33
10. How did cavemen live?	24	6	3	0	33
11. What causes changes in climates?	23	8	2	0	33
12. What causes cells to shrink?	23	6	4	0	33
13. What is a glacier?	23	3	6	1	33
14. What is the diameter of the earth?	21	9	2	1	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care	Total
15. What are some invertelrate animals?	22	8	3	0	33
16. What is the nature of bacteria?	27	2	4	0	33
17. Who was Malthus?	23	6	4	0	33
18. What is the food cycle?	23	9	1	0	33
19. What causes the population to increase?	19	10	2	1	33
20. What are the races of pre-historic man?	22	9	2	0	33
21. What is horizon?	25	4	3	1	33
22. Are igneous rocks very hard?	21	4	8	0	33
23. What causes lava to flow?	22	6	4	1	33
24. What major direction do rivers flow?	21	5	7	0	33
25. How do birds live?	28	3	2	0	33
26. What are parasites?	25	6	1	1	33
27. What is parthenogenesis?	25	5	2	1	33
28. What is an albino?	24	5	4	0	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
29. What pre-historic organism still exist?	26	6	1	0	33
30. How are fossils formed?	27	4	2	0	33
31. How fast does the earth rotate?	23	10	0	0	33
32. What materials are stones made of?	22	6	4	1	33
33. How can we forecast weather conditions?	24	7	2	0	33
34. What is air composed of?	26	7	2	0	33
35. What are mammals?	22	9	2	0	33
36. Why does bread rise?	24	7	2	0	33
37. What is self-pollination?	28	3	2	0	33
38. What is the mole chromosome?	21	11	1	0	33
39. How does nature provide?	24	8	1	0	33
40. What causes skin - color?	19	14	0	0	33
41. In what direction is the earth turning?	23	8	1	1	33
42. How are soils formed?	27	4	2	0	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
43. Where do ships load?	20	2	9	2	33
44. What are the continents?	25	4	4	0	33
45. Are all snakes poisonous?	21	8	4	0	33
46. How do trees grow?	25	4	4	0	33
47. What is adoptation?	25	6	2	0	33
48. What is a mixture?	26	4	3	0	33
49. What is evolution?	26	6	1	0	33
50. How can the human race be improved?	12	20	1	0	33
51. What is biology?	20	11	2	0	33
52. How do we inherit hair type?	14	16	3	0	33
53. What is gravity?	22	6	2	3	33
54. How are stones constructed?	21	1	9	2	33
55. What are oasis?	25	2	4	2	33
56. Do all beaches contain sand?	21	4	5	3	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
57. What animals live in the deep sea?	26	5	2	0	33
58. How are seeds made?	24	3	4	2	33
59. Are all individuals different?	24	7	2	0	33
60. How can animals be tamed?	24	5	3	1	33
61. How do we think?	14	18	1	0	33
62. What causes seasons to change?	26	4	2	1	33
63. How are boulders designed?	24	3	5	1	33
64. When is a volcano active?	26	4	2	1	33
65. Where does lova come from?	26	4	3	0	33
66. How are plants and animals classified?	25	7	1	0	33
67. What are some cone bearing plants?	29	1	3	0	33
68. Are leech bloodsuckers?	26	5	2	0	33
69. Does crime pay?	20	11	2	0	33
70. Do twins come from the same egg?	14	17	1	1	33

TABLE 5

GROUP TESTIMONY - INVENOTRY III

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
71. What is the relations of the earth to the solar system?	25	6	2	0	33
72. What minerals are essential for life?	25	4	4	0	33
73. How are deltas formed?	22	5	5	1	33
74. What causes large cracks in the earth?	23	8	2	0	33
75. How do we breathe?	20	10	3	0	33
76. How are organisms classified?	24	5	4	0	33
77. Are hormonious relations necessary?	26	2	3	2	33
78. Is mockery an art?	24	5	3	1	33
79. How can future generations be improved?	26	6	1	0	33
80. Where do we find most fossils?	25	4	4	0	33
81. What is formed when organisms decay?	23	4	6	0	33
82. How is clay distinguished?	28	1	3	1	33
83. Where is the islet of Longerhams located?	26	3	4	0	33
84. How do we use food?	23	9	1	0	33

TABLE 5

GROUP TESTIMONY - INVENTORY III

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
85. Where do fungi plants grow?	26	3	4	0	33
86. Are Mushrooms safe to eat?	27	2	3	1	33
87. What is enviornment?	20	10	2	1	33
88. Are more people being borned?	19	13	0	1	33
89. What are the classes of people?	18	14	1	0	33
90. How was the earth formed?	23	9	1	0	33
91. What is diastrophism?	25	4	3	1	33
92. What causes the earth to tremble?	26	7	0	0	33
93. How is time measured?	27	4	2	0	33
94. What are flowerless plants called?	29	2	2	0	33
95. Are all things made equal?	24	7	2	0	33
96. What are germs?	25	8	1	0	33
97. How many plants are in our solar system?	24	7	1	0	33
98. What is pigmentation?	24	7	2	0	33
99. How do organisms protect themselves?	29	3	1	0	33
100. How can we remain healthy?	18	14	1	0	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Ttems	Interested	Very Interested	Not Interested	"Don't Care"	Total
1. The Story of Earth's Oxis	24	5	3	1	33
2. The Amazing reason for evaporation	29	2	1	1	33
3. The destructive results of Erosion	29	2	2	0	33
4. The ways of measuring distance	29	0	4	0	33
5. The purpose of the backbone	28	0	4	0	33
6. The mystery of mildew	27	3	3	0	33
7. The story of animals add plants life	24	5	4	0	33
8. Strange tales about relationship	23	7	3	0	33
9. The truth about foods	18	12	3	0	33
10. The fascinating story about Pava-man	23	4	5	1	33
11. Interesting facts about weather	24	4	5	0	33
12. The ability of some liquids to condense	27	3	3	0	33
13. The romance of the glacial age	21	10	2	0	33
14. The diameter of the world	23	6	3	1	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
15. Some unusual vegtebrates	24	6	3	0	33
16. Amazing facts about bacteria	27	5	1	0	33
17. The life of a political econ0mist	26	2	5	0	33
18. The mystery of the food cycle	26	5	2	0	33
19. The high rate of mortality	29	3	1	0	33
20. The mysterious animals of the past	24	5	4	0	33
21. Facts about harizon	27	1	4	1	33
22. Remarkable facts about igneous rocks	23	2	8	0	33
23. Dangers of volcanoes	23	4	6	0	33
24. The work of meandering streams	23	2	8	0	33
25. Strange stores about birds	25	3	5	0	33
26. The dangers of parasites	24	5	4	0	33
27. The purposes of breeder's choice	29	2	2	0	33
28. The results of recessive genes	22	6	5	0	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Items	V Interested	Very Interested	Not Interested	"Don't Care"	Total
29. The remains of pre-historic organisms	24	6	3	0	33
30. The findings of fossils in China	25	4	4	0	33
31. The wonders of the universe	24	4	5	0	33
32. Interesting facts about stones	21	3	9	0	33
33. The startling effects of tornados	28	4	1	0	33
34. The layers of the atmosphere	25	5	3	0	33
35. Familiar viviparous mammals	24	5	4	0	33
36. The mystery of yeasts	23	3	7	0	33
37. The usual results of inbreeding	22	8	3	0	33
38. The significance of sex-linked genes	16	16	1	0	33
39. The selection by nature	23	7	3	0	33
40. Genes responsible for skin color	21	11	1	0	33
41. Causes of earth rotation	25	7	1	0	33
42. The work of nature in transformating stones	21	3	8	0	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
43. The advantage of docks for loading	22	2	8	1	33
44. Remarkalbe facts about the continents	28	0	5	0	33
45. Dangers of some snakes	18	11	4	0	33
46. Romance of forestry	26	4	3	0	33
47. Adjustment of Organisms to their enviornment	29	2	2	0	33
48. The components of a mixture	26	6	1	0	33
49. The tremendous social changes of the past	26	6	1	0	33
50. Practical information about earthquakes	25	5	3	0	33
51. The story about plants and animals	25	8	0	0	33
52. The miraculous work of genes for hair	27	1	5	0	33
53. Astounding facts about gravity	25	1	7	0	33
54. Geological knowledge of rock structure	25	2	6	0	33
55. The mystery oasis	26	1	6	0	33
56. Amazing reasons for sand formation	24	4	5	0	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
57. Unusual animals of the deep sea	25	1	6	1	33
58. The fascinating story of seeds	26	4	2	1	33
59. The results of cross-breeding	22	5	6	0	33
60. The art of domesticating animals	22	10	1	0	33
61. The mystery of intelligence	25	5	3	0	33
62. The romance of the seasons	24	3	6	0	33
63. Practical geometric figures	23	6	4	0	33
64. The dangers of volcanoes	26	3	4	0	33
65. The composition of Lova	24	3	6	0	33
66. The method of catogoring plants and animals	29	0	4	0	33
67. Fascinating facts about conifers	29	3	1	0	33
68. How leech become bloodsucksers	22	4	7	0	33
69. The shocking story of theives in the night	17	14	2	0	33
70. The truth about human reproduction	22	7	4	0	33

TABLE 6

GROUP TESTIMONY - INVENTORY IV

Items	Interested	Very Interestedq	Not Interested	"Don't Care"	Total
71. Amazing facts about the universe	24	3	6	0	33
72. The values of minerals	24	3	6	0	33
73. Some outstanding works of rivers	25	4	4	0	33
74. The results of Earth's faults	24	5	3	0	33
75. The mystery of breathing	25	5	3	0	33
76. The reason for classification	25	4	4	0	33
77. The necessity of mutual relations	24	2	7	0	33
78. Some tolented mimics	25	5	3	0	33
79. Some practical examples on population improvements	24	6	3	0	33
80. The mysterious animals of the past	24	4	4	0	33
81. The amazing results of chemical changes	25	2	5	0	33
82. The remarkable history of soils	21	5	7	0	33
83. The tales of floating uslands	23	8	2	0	33
84. Conversion of food materials	26	3	4	0	33
85. Fascinating facts about fungi plants	25	1	7	0	33

TABLE 6

GROUP TESTIMONY-INVENTORY IV

	Items	Interested	Very Interested	Not Interested	"Don't Care"	Total
86.	Practical knowledge about mushrooms	24	6	3	0	33
87.	The remarkable conditions of life	24	9	0	0	33
88.	The increased world population	24	8	1	0	33
89.	The origin of racial classes	23	7	3	0	33
90.	The mysterious creation of the earth	23	3	7	0	33
91.	The shocking results of diastrophisms	26	1	4	2	33
92.	The disastrous results of earthquakes	27	0	6	0	33
93.	Techniques of measuring time	22	3	8	0	33
94.	Many varieties of vegetables	25	5	2	1	33
95.	Inherited inequalities of mankind	25	3	5	0	33
96.	Strange facts about microbes	26	4	3	0	33
97.	Useful knowledge about plants	22	8	3	0	33
98.	The natives of Africa	25	6	2	0	33
99.	The adaptation of organisms to their environment	17	15	1	0	33
100.	The startling results of human disease	18	14	1	0	33

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
1. Earth's Axis	26	30	33	29
2. Evaporation	29	25	30	31
3. Erosion	22	25	30	31
4. Longitude	21	26	31	29
5. Vetebrates	29	31	32	28
6. Molds	13	24	27	30
7. Compt. Among Animals and Plants	25	28	31	29
8. Symbiosis	16	29	28	30
9. Food	32	33	31	30
10. Heidelberg Man	22	31	30	27
11. Climate	31	32	31	28
12. Condensation	27	23	29	30
13. Glaciers	22	27	26	31
14. Latitude	21	26	30	29

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
15. Invertebrates	25	31	30	30
16. Fungi	23	31	29	32
17. Malthus & Overpopulation	24	30	29	28
18. The Food Chain	30	21	32	31
19. Birth-Death Rates	30	31	32	32
20. Jona-man	22	26	31	29
21. Horizon	23	21	29	28
22. Igneaus	16	27	25	25
23. Volcanoes	23	26	28	27
24. Streams-Rivers	15	26	26	25
25. Birds	28	29	31	28
26. Mosses	21	26	31	29
27. Artificial Selection	20	21	30	31
28. Recessive Genes	17	26	29	28
29. Survival of Species	21	28	32	30
30. Peking-man	24	25	31	29

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
31. Revolution of Earth	31	28	33	28
32. Sedimentary Rock	17	24	24	24
33. Weathering	26	30	313	32
34. Atmospheric Conditions	27	28	33	30
35. Mammals	26	28	31	29
36. Yeasts	16	23	31	26
37. Inbreeding	21	31	31	30
38. Sex-linked Characters	31	30	32	32
39. Natural Selections	25	24	32	30
40. Inheritance of Skin Color	31	25	33	32
41. Rotation of Earth	30	30	31	32
42. Metamorphic Rock	15	23	31	24
43. Durability of Land Features	21	25	22	24
44. Peninsulas	18	27	29	28
45. Reptiles	24	25	29	29
46. Bryophytes	17	30	29	30

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
47. Adaptation in Plants and Animals	27	25	31	31
48. Hybrids	20	30	29	31
49. Common Ancestors of Man	30	31	32	32
50. Euthenics	15	31	32	32
51. Biotic Potentials	16	30	31	30
52. Inheritance of Hair Texture	30	23	30	33
53. Gravity	27	32	28	28
54. Cleanage of Rocks	17	21	22	26
55. Sand Dunes	19	26	27	27
56. Coastal Regions	23	27	25	27
57. Fish	27	30	31	28
58. Monocatyledons	19	26	27	27
59. Modification of Inherited Characters	26	24	31	30
60. Domestication of Plants and Animals	27	30	29	27
61. Inheritance of Intelligence	31	28	32	32

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
62. Sterilization	28	28	32	30
63. The Seasons	29	27	30	30
64. Boulders	18	20	27	27
65. Mountain Formation	25	27	30	29
66. Magma	17	30	29	29
67. The Plant and Animal Phyla	19	29	32	27
68. The Conifers	19	25	30	29
69. Parasitism	25	25	31	32
70. The Predtors	19	27	31	26
71. Twins-triplets-quadruplets	29	30	31	31
72. The Sun	33	30	31	29
73. Minerals	31	28	29	27
74. Rivers and Their Works	26	29	27	27
75. Earth Fractures	27	30	31	29
76. Respiration	32	31	30	31
77. Stomata	25	31	29	30

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
78. Ecology	28	25	28	29
79. Mimicry	23	23	29	26
80. Eugenics	22	26	32	30
81. Fossils	28	29	29	30
82. Copernicus	21	27	30	30
83. Animal & Plant Remains	25	28	27	28
84. Loess	15	18	29	27
85. Islands	22	20	29	26
86. Digestion	31	25	32	31
87. Thallaphytes	27	29	29	29
88. Saprophytes	23	22	29	26
89. The Influence of Environment	28	26	30	30
90. Population Curves	28	26	32	33
91. Caucasians	14	30	32	32
92. Origin of the Earth	26	32	32	30

TABLE 7

GROUP CONSISTENCY OF RESPONSE

	INTEREST			
	Inventory I	Inventory II	Inventory III	Inventory IV
93. Deastrophism	21	29	29	26
94. Earthquakes	26	32	33	27
95. Meridian and Time	26	29	31	27
96. Pteridophytes	22	27	31	25
97. Homology	28	28	31	30
98. Negroes	33	24	31	30
99. Survival of the Fittest	24	29	32	31
100. Health	32	32	32	32

Group Consistency of Testimony.--This section of Chapter II presents data which identifies the extent and range of testimony for a period of five weeks. Table 8 presents the group data pertaining to the subjects testimony about items of interest which relate to category I (methods of Science). The data pertain to inventories administered at one (1) week intervals. It is informative to note that, while all the 10 items deal with methods of Science, items 1, 11, 21, 31, and 41 refer to knowledge, items 51, and 61, refer to comprehension, and items 71, 81, and 91, refer to analysis.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding items 11, 31, 41, 61, 71, and 81 (decile range of less than 1), and the lowest consistency was for item 91.

Reference to the table on word difficulty (count) reveals that the word Caucasions (91) Inventory I had aG count of 1, a T count of 10, an L count of 5, J count of 4, and S count of 14. Since the interest remained fairly stable when the synonym "classes of people" was introduced in Inventory II, we can explain this deviation by the fact that this word phrase was prdably outside the understanding and meaningful field, of these subjects, whereas the synonym was not. This word may not be a "southern", "regional" or "local" word. The word usually used is "white folks."

On the other hand, the reverse is true of item 21, "Horizon". The students interests in this area were relatively low on Inventory I and dropped a decile on Inventory II when introduced as the synonym "range." However, when re-introduced as the question, "What is horizon?" in inventory III it rose to 9 and remained there when "salesmanship" term was introduced.

TABLE 8

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

		Decile Ranking			
Category: Methods of Science		I Inventory	II Inventory	III Inventory	IV Inventory
Item:	1	8	9	10	9
"	11	10	10	10	9
"	21	7	6	9	9
"	31	10	9	10	9
"	41	9	9	10	10
"	51	5	9	10	9
"	61	9	9	10	9
"	71	9	9	10	10
"	81	9	9	9	9
"	91	4	9	10	9
Total Average decile		8.0	8.8	9.8	9.2

Table 9 presents group data pertaining to the subjects testimony about items of interest which relate to category 2 (minerals and rocks). The data pertain to inventories administered at one week intervals. It is informative to note that while all items pertain to rocks and minerals, items 2, 12, 22, 32, and 42 refer to knowledge, and items 52, 62, 72, 82 and 92 refer to comprehension.

The data indicate the subjects maintained a relatively high order of consistency of testimony regarding items 2, 62, 72 and 92, and a lower consistency for items 12, 22, 32, 42, 52, and 82; the lowest consistency was for item 42.

Reference to the table on word difficulty (count) reveals that the words of metamorphic rock (42) Inventory I. Metamorphic was not listed but rock had a G count of AA, a T count of M, an L count of F 509, a J count of ? , and an S count of 678. Since the interest rose when the synonym, "transforming stone" was introduced in inventory 2 we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaning field of these subjects whereas the synonyms were not. This word or phrase may not be a "Southern", "regional", or "local" word of phrase. The most commonly used word is "rock."

On the other hand the reverse is true of item 12. The students' interests in this area were relatively low in Inventory I, and dropped one (1) decile in Inventory II. However, when re-introduced as a question, it remains at this level and rose two (2) deciles when "salesmanship" term was introduced.

Table 10 presents the group data pertaining to the subjects testimony about items of interest which relates to category 3 (Changes in Land

TABLE 9

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Minerals and Rocks		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	2	9	8	9	10
"	12	8	7	9	9
"	22	7	8	8	10
"	32	5	7	7	7
"	42	4	7	10	7
"	52	9	7	9	10
"	62	10	9	10	10
"	72	10	9	10	9
"	82	6	8	9	9
"	92	8	10	10	9
Total Average decile		7.6	8.0	9.1	9.0

TABLE 10

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Changes In Land Features		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	3	7	8	9	10
"	13	7	8	8	10
"	23	7	8	9	8
"	33	8	9	10	10
"	43	6	8	7	7
"	53	8	10	9	9
"	63	9	8	9	9
"	73	10	9	9	8
"	83	9	8	9	8
"	93	6	9	9	8
Total Average decile		7.6	8,6	8.7	8.8

Features). The data pertain to inventories administered at one (1) week intervals. It is informative to note that, while all the items pertain to Changesin Land Features, items 3, 13, 23, and 33 refer to knowledge, items 43, 53, 63, and 73 refer to comprehension, and items 83, and 93 refer to application.

The data indicate that these subjects maintained a relatively high order of consistency of testimony refarding items 33, 53, and 73 (decile range of less than 1) and moderately high in the other areas except for the lowest consistency was for item 93.

Reference to the table on word difficulty (count) reveals that the word diastrophism (93) Inventory I was not listed. Since the interest remained fairly constant when the synonym "deformed earth" was introduced in Inventory II, we can explain deviation by the fact that this word or phrase wasprobably outside the understanding and meaningful field of these subjects whereas the synonym was not. This word may not be a "Southern", "regional", or "local" word. The word usually used is "erosion."

On the contrary, the reverse is true of item 63. The student interests in this area were high on Inventory I, and dropped on (1) decile in Inventory II when it was introduced as the synonym "alternation," it dropped one (1) decile. Whereas in inventories 3 and 4 it rose to 9 and remained.

Table II presents the group data pertaining to the subjects testimony about items of interest which relate to category 4 (Interpretation of Land Features). The data pertain to inventories administered at one (1) week intervals. It is informative to note that, while all the items pertain to Interpretation of Land Features, items 4 and 14 refer to knowledge,

TABLE 11

Comparative GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Interpretation of Land Features		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	4	6	8	10	9
"	14	6	8	9	9
"	24	4	8	8	8
"	34	8	9	10	9
"	44	5	8	9	9
"	54	5	6	7	8
"	64	5	6	8	8
"	74	8	9	8	8
"	84	4	5	9	8
"	94	8	10	10	8
Total Average decile		5.9	8.0	8.8	8.4

items 24 and 34 refer to comprehension, items 44, 34, 64, 74, 84, and 94 refer to application.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding items 34, and 94 (decile range less than 1) and were also fairly high in other areas except for item 84 which is lowest.

Reference to the table on word difficulty (count) reveals that the word Loess (84) Inventory I was not listed. Since the interest remained fairly stable when the synonym "clay" was introduced in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects, whereas the synonym was not. This word may or may not be a "Southern", or "regional," or "local" word. The word usually used is "clay" or "dirt".

For item 24 the students interests in this area was very low in Inventory I, and rose four (4) deciles on Inventory II when re-introduced as the synonym "currents and rapids" and maintained an interval of four on the remaining inventories.

Table 12 presents the group data pertaining to the subjects testimony about items of interest which relate to category 5 (Animal Classification). The data pertains to inventories administered at one (1) week intervals. It is informative to note that, while all the items pertain to Animal Classification, items 5, and 15 refer to knowledge, items 25, 35, 45, and 55 refer to comprehension, items 65, 75, 85, and 95 refer to application.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding items 5, 15, 25, 35, and 75

TABLE 12

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Animal Classification		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	5	9	10	10	9
"	15	8	10	9	9
"	25	9	9	10	9
"	35	8	9	10	9
"	45	7	8	9	9
"	55	6	8	8	8
"	65	8	8	9	9
"	75	8	9	10	9
"	85	7	6	9	8
"	95	8	9	10	8
Total Average decile		7.8	8.6	9.4	8.7

(decile range less than 1), and the lowest consistency was for item 55.

Reference to the table on word difficulty (count) reveals that the words Sand Dunes (55) Inventory I had a G count (for sand) of A, a T count of 700, an L count of 200, a J count of 415 and an S count of 344. G count (for dunes) 3, a T count of 28, an L count of 13, a J count of 5 and S 12. Since the interest remained fairly stable when the synonym "desert mounds" was introduced in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects, whereas the synonym was not. This word may not be a "Southern", "regional", or "local" word. The word usually used is "sand pile" or "piles of sand."

This was also true of item 85. The students interests on this area were relatively low on Inventory I, and dropped a decile on Inventory II when introduced as the synonym "islet." However, when re-introduced as the question "where is the islet of Langerhans located?" in Inventory III, it rose to 9 and then dropped to 8 in Inventory IV when re-introduced as a "salesmanship" term "The Tales of Floating Islands."

Table 13 presentsthe group data pertaining to the subjects testimony about items of which relate to category 6 (The Plants of the Earth). The data pertain to inventories administered at (1) week intervals. It is informative to note that, while all the items pertain to The Plants of the Earth, items 6, 16, 26, and 36 refer to knowledge, items 46, 56, 66 and 76 refer to comprehension, items 86 and 96 refer to application.

The data indicate that these subjects maintained a relatively high consistency of testimony regarding items 16, 76, and 86 (decile range of less than 1), and the lowest consistency was for item 6.

TABLE 13

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Plants of the Earth		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	6	4	7	8	9
"	16	7	10	9	10
"	26	6	8	10	9
"	36	5	7	10	8
"	46	5	9	9	9
"	56	7	8	8	8
"	66	5	9	9	9
"	76	10	10	9	10
"	86	10	10	8	10
"	96	7	8	10	8
Total Average decile		6.6	8.4	9.2	9.0

Reference to the word table on difficulty (count) reveals that the word mold (6) Inventory I had a G count of 22, a T count of 50, an L count of 206, a J count of 91, and S 65. Since the interest remained fairly stable when the synonym "mildew" was introduced in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects, whereas the synonym was not. This word may not be a "Southern," "regional," or "local" word. The word usually used is "spoiled."

On the contrary, the reverse is true of item 86. The students interests in this area were high on Inventory I and dropped 2 deciles on Inventory II when re-introduced as the synonym "absorbtion." However, when re-introduced as the question "what causes molds?" Inventory III, it rose 2 deciles and remained constant thereafter for Inventory IV.

Table 14, presents the group data pertaining to the subjects testimony about items of interest which relate to category (Population and the Mechanism of Evolution). The data pertain to inventories administered at one (1) week intervals. It is informative to note that, while all the items pertain to Population and the Mechanism of Evolution, items 7, 17, and 27, refer to knowledge, items 37, 47 and 57 refer to comprehension, items 67, 77, 87, and 97 refer to analysis.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding items 7, 47, 57, 77 and 97 (decile range of less than 1), and the lowest consistency was for item 27.

Reference to the table on word difficulty (count) reveals that the

TABLE 14

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

	Decile Ranking			
Category: Population and the Mechanism of Evolution	I Inventory	II Inventory	III Inventory	IV Inventory
Item: 7	8	9	10	9
" 17	7	9	9	9
" 27	6	6	9	10
" 37	6	10	10	9
" 47	8	8	10	10
" 57	8	9	10	9
" 67	6	9	10	8
" 77	8	10	9	9
" 87	8	9	9	9
" 97	9	9	10	9
"				
Total Average decile	7.4	8.8	9.6	9.1

words artificial selection (27) Inventory I had aG count (for artificial) of 20, a T count of 76, an L count of 93, a J count of 52, and an S count of 145. G count for selection was 17, a T count of 57, an L count of 131, a J count of 39, and an S count of 93. Since the interest remained stable when the synonym "synthetic preference" was introduced in Inventory II, we can explain this by the fact that these sets of words used in Inventories I and II were probably outside the understanding and meaningful field of these subjects. This word may not be a "Southern," "regional", or "local" word. The word usually used is "false" or "untrue."

Interest rose when stated as a problem and remained stable when "salesmanship" was introduced.

Table 15, presents the group data pertaining to the subjects' testimony about items of interest which relate to category 8 (Variation and Selection). The data pertain to inventories administered at one (1) week intervals. It is informative to note that while all the items pertain to Variation and Selection, item 8 refers to comprehension; items 18, 28, 38, 48, and 58, refer to application; and items 68, 78, 88, and 98 refer to analysis.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding item 38 (decile range of less than 1) and the lowest consistency was for item 28.

Reference to the table on word difficulty (count) reveals that the words recessive genes (28) Inventory I had a G count (for recessive) of 1, a T count of 16, an L count of 2, a J count of 0, and an S count of 0. The word genes was not in this word list. Since the interest rose three

TABLE 15

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

Category: Variation and Selection		Decile Ranking I Inventory	II Inventory	III Inventory	IV Inventory
Item:	8	5	9	9	9
"	18	9	6	10	10
"	28	5	8	9	9
"	38	10	9	10	10
"	48	6	9	9	10
"	58	6	8	9	9
"	78	9	8	9	9
"	88	7	7	9	8
"	98	10	7	10	9
Total Average decile		7.3	7.9	9.2	9.1

(3) deciles when the synonym "receded heritage" was introduced in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects; whereas the synonym was not. This word or phrase may not be a "Southern," "local," or "regional" word. The word usually used is "ill-deformed."

On the contrary, one of the reversals is of item 98. The students' interests in this area were high on inventory I and dropped three (3) deciles on Inventory II when re-introduced as the synonym "Ebony." However, when re-introduced as the question, "what is pigmentation?" in Inventory III, it rose three (3) deciles and dropped again one (1) decile when the "salesmanship" term, "The Natives of Africa" was introduced in inventory four (4). This may reflect an antipathy to "black" and "Africa" which is somewhat typical among southern Negroes due to their rejection by whites. It is also a culturally typical ambivalence.

Table 16 presents the group data pertaining to the subjects' testimony about items of interest which relate to category 9 (Facts of Evolution and the Theory that Explains Them). The data pertain to inventories administered at one (1) week intervals. It is informative to note that while all the items pertain to Facts of Evolution and the Theory that Explains Them, items 9 and 19 refer to comprehension, items 29 and 39 refer to application, items 49, 59, 69, 79, 89, and 99 refer to analysis.

The data indicate that these subjects maintained a relatively high order of consistency of testimony regarding items 9, 19, 49, 69, and

99 (decile range of less than 1), and the lowest consistency was for item 29.

Reference to the table on word difficulty (count) table reveals that the word, "survival of the species" (29) Inventory I had a G count (for survival) of 4, a T count of 18, an L count of 18, a J count of 4, and an S count of 2. Since the interest rose three (3) deciles when introduced as the synonyms, "remains of the class" in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects; whereas, the synonym was not. This word may not be a "southern," "regional," or "local" word. The word usually used is "evolution."

On the other hand, the reverse is true of items 39 and 59. The students' interests in this area were relatively low on Inventory I and dropped a decile on Inventory II. However, when re-introduced as a question in Inventory III, rose one (1) decile and again one (1) decile in Inventory IV.

Table 17 presents the group data pertaining to the subjects' testimony about items of interest which relate to category 10 (Evolution, Genetics and the Races of Man). The data pertain to inventories administered at one (1) week intervals. It is informative to note that, while all the items pertain to Evolution, Genetics and the Races of Man, items 10, 20, and 30 refer to comprehension; items 40, 50, 60, and 70 refer to application; items 80, 90, and 100 refer to analysis.

The data indicate that these subjects maintained a relatively high

TABLE 16

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

		Decile Ranking			
Category: Facts of Evolution and the theory that explain them		I Inventory	II Inventory	III Inventory	IV Inventory
Item:	9	10	10	10	9
"	19	9	10	10	10
"	29	6	9	10	9
"	39	8	7	10	9
"	49	9	10	10	10
"	59	8	7	10	9
"	69	8	8	10	10
"	79	7	7	9	8
"	89	9	8	9	9
"	99	7	9	10	10
Total Average decile		8.1	8.3	9.8	9.3

TABLE 17

COMPARATIVE GROUP CONSISTENCY OF TESTIMONY AT ONE WEEK INTERVAL

	Decile Ranking				
					Y
Category: Evolution, Genetics and the Races of man		I Inventory	II Inventory	LLL Inventory	IV Inventory
Item:	10	7	10	9	8
"	20	7	8	10	9
"	30	7	8	10-	9
"	40	10	8	10	10
"	50	4	10	10	10
"	60	8	9	9	8
"	70	6	8	10	8
"	80	7	8	10	9
"	90	9	8	10	10
"	100	10	10	10	10
Total Average decile		7.5	8.7	9.8	9.1

order of consistency of testimony regarding items 40, 90, and 100 (decile range of less than 1), and the lowest consistency was for item 50.

Reference to the table on word difficulty (count) reveals that the word "euthenics" (50) Inventory I was not listed. Since the interest remained fairly stable when the synonym "improvements" was introduced in Inventory II, we can explain this deviation by the fact that this word or phrase was probably outside the understanding and meaningful field of these subjects, whereas the synonym was not. This word may not be a "Southern," "regional," or "local" word. The word usually used is "breeding."

On the contrary, the reverse is true of item 40 and 90. The students' interests in this area were relatively high on Inventory I, and dropped a decile in Inventory II. However, when re-introduced as a question interests rose to 10 and remained there when "salesmanship" term was introduced.

Overall Average Consistency of Testimony

I. Category 1. Methods of Science.--The overall average consistency of testimony for Category 1 reveals a relatively high interest.
   1. Subjects' interests were relatively high on items of knowledge in this category.
   2. The subjects' interests were relatively high on items of comprehension in this category.
   3. The subjects' interests were relatively high on items of analysis in this category.

II. Category 2. Minerals and Rocks.--The overall average consistency of testimony for Category 2 reveals a relatively high interest.

1. The subjects' interests were fairly high on items of knowledge in this category.
2. The subjects' interests were relatively high on items of Comprehension in this category.

III. Category 3. Changes in Land Features.--The overall average consistency of testimony for Category 3 reveals a relatively high interest.

1. The subjects' interests were fairly high on items of knowledge in this category.
2. The subjects' interests were relatively high on items of comprehension in this category.
3. The subjects' interests were relatively high on items of application in this category.

IV. Category 4. Interpretation of Land Features.--The overall average consistency of testimony for Category 4 reveals a fairly high interest.

1. The subjects' interests were fairly high on items of knowledge in this category.
2. The subjects' interests were fairly high on items of comprehension in this category.
3. The subjects' interests were fairly high on items of application in this category.

V. Category 5. Animal Classification.--The overall average consistency of testimony for Category 5 reveals a high interest.

1. The subjects interests were high on items of knowledge in this category.
2. The subjects' interests were relatively high on items of

comprehension in this category.

3. The subjects' interests were relatively high on items of application in this category.

VI. Category 6. The plants of the Earth.--The overall average consistency of testimony for Category 6 reveals a relatively high interest.

1. The subjects' interests were fairly high on items of knowledge in this category.
2. The subjects' interests were relatively high on items of comprehension in this category.
3. The subjects' interests were relatively high on items of application in this category.

VII. Category 7. Populations and the Mechanisms of Evolution.--The overall average consistency of testimony for Category 7 reveals a high interest.

1. The subjects' interests were fairly high on items of knowledge in this category.
2. The subjects' interests were relatively high on items of comprehension in this category.
3. The subjects' interests were relatively high on items of analysis in this category.

VIII. Category 8. Variation and Selection.--The overall average consistency of testimony for Category 8 reveals a relatively high interest.

1. The subjects' interests were fairly high on items of comprehension in this category.
2. The subjects' interests were relatively high on items of application

in this category.

3. The subjects' interests were relatively high on items of analysis in this category.

IX. Category 9. Facts of Evolution and the Theory that Explains Them.--The overall average consistency of testimony for Category 9 reveals a relatively high interest.

1. The subjects' interests were high on items of comprehension in this category.
2. The subjects' interests were relatively high on items of application in this category.
3. The subjects' interest were relatively high on items of analysis in this category.

X. Category 10. Evolution, Genetics and the Races of Man.--The overall average consistency of testimony for Category 10 reveals a high interest in this category.

1. The subjects' interests were relatively high on items of comprehension in this category.
2. The subjects' interests were relatively high on items of application in this category.
3. The subjects' interests were relatively high on items of analysis in this category.

Table 19 presents striking group deviations for interest on the four inventories. This table of deviation shows how inconsistent these subjects were for each category in which there was a range of 2 plus deciles

TABLE 18

DECILES BY CATEGORIES

Category	Decile Ranking				
	Inventory I	Inventory II	Inventory III	Inventory IV	
1	8.0	8.8	9.8	9.2	8.95
2	7.6	8.0	9.1	9.0	8.4
3	7.6	8.6	8.7	8.8	8.4
4	5.9	8.0	8.8	8.4	7.7
5	7.8	8.6	9.4	8.7	8.6
6	6.6	8.4	9.2	9.0	8.3
7.	7.4	8.8	9.6	9.1	8.7
8	7.3	7.9	9.2	9.1	8.4
9	8.1	8.3	9.8	9.3	8.8
10	7.5	8.7	9.8	9.1	8.8
	7.18	8.41	8.85	8.87	

TABLE 19

TABLE OF DEVIATION ON TESTIMONY

Category	Inventory I	Inventory II	Inventory III	Inventory IV
I. Methods of Science				
Item: 21	7	6	9	9
" 51	5	9	10	9
" 91	4	9	10	9
II. Minerals and Rocks				
Item: 22	7	8	8	10
" 42	4	7	10	7
" 82	6	8	9	9
III. Changes in Land Features				
Item: 23	7	8	9	8
" 43	6	8	7	7
" 93	6	9	9	8
IV. Interpretation of Land Features				
Item 24	4	8	8	8
" 44	5	8	9	9
" 64	3	5	9	8
" 84	4	5	9	8
V. Animal Classification				
Item 55	6	8	8	8
" 85	7	6	9	8
VI. The Plants of the Earth				
Item 6	4	7	8	9
" 36	5	7	10	8
" 46	5	9	9	9
" 66	5	9	9	9

TABLE 19 (CONTINUED)

TABLE OF DEVIATION ON TESTIMONY

Category	Inventory I	Inventory II	Inventory III	Inventory IV
VII. Populations and Mechanisms of Evolution				
Item: 27	6	6	9	10
" 37	6	10	10	9
" 67	6	9	10	8
VIII. Variation and Selection				
Item: 8	5	9	9	9
" 28	5	8	9	9
" 48	6	9	9	10
IX. Facts of Evalution and the Theory that Explains Them				
Item: 29	6	9	10	9
" 39	8	7	10	9
" 59	8	7	10	9
X. Evolution, Genetics and the Races of Man				
Item: 10	7	10	9	8
" 50	4	10	10	10
" 70	6	8	10	8

TABLE 20

Student Preferences for Scenic Areas by Categories in Descending Order

Category	Area
I.	Methods of Science
IX.	Facts of Evolution and the Theory that Explains them
X.	Evolution, Genetics and the Races of Man
VII.	Populations and the Mechanisms of Evolution
V.	Animal Classification
II.	Minerals and Rocks
III.	Changes in Land Features
VIII.	Variation and Selection
VI.	The Plants of the Earth
IV.	Interpretation of Land Features

in interest on the four (4) science inventories. These items showed a comparatively great deviation for the group as a whole. A high number found in any particular inventory reveals that the subjects were highly interested in the items of that particular category. Whereas a lower number found in any one or all four (4) inventories reveals that the subjects interests were low or that they were unfamiliar with the words, synonyms, questions or salesmanship terms used in these inventories.

Out of 100 items on each inventory, a total of 31 instances of wide deviation appeared. Again, in these specific instances, as for the group, the factors which appeared to occasion the range and deviation in interest are strikingly revealed in Inventory I, and decreasingly in the other inventories.

Summary.--Generally, we can say that these respondents, despite certain deviations in the consistency of their testimony of interest on the ten categories and the 100 items, had a very high or relatively high degree of interest in the various science areas to which these inventories exposed them, and that their interests remained relatively stable for each of the categories when the category is viewed as a whole. Please note Table 18 which presents the average deciles for the ten categories by inventories.

Before going into a more detailed analysis of Tables 8-17, it should also be indicated that, while the words were subjected to a rigid scrutiny by reference to the word counts, and while the words should have been in the subjects' field, in too many instances they appeared not to reside in their vocabularies. One is therefore forced to assume that these subjects

for whatever reason, are not at the anticipated vocabulary level. This is not surprising, however, as numerous previous studies have also identified the same results. In most instances it has been stated that the differences are due not to race, but to cultural deprivation of Negroes.

Analysis of Table 18 indicates that the average of the average deciles shows the lowest interest ratings were found in Inventory I, the next highest in Inventory II, and the next highest in Inventory III, with a very slightly higher rating for Inventory IV. This tends to imply that, generally, these subjects are more susceptable to expressing interest when the science subject matter is presented as a problem and/or when "salesmanship" is utilized to "sell" the area.

The implications of this for science teachers who desire to improve their courses, and who are also willing to engage in teacher-pupil planning in which the interest of the pupils are seriously considered in structuring the course, are quite clear. In fact, the data rather conclusively indicate that science areas presented as problems and with motivational or hidden meanings will receive higher and more consistant student interest than when stated as a topic or in other conventional form.

Analysis by Sex.--It was possible to develop a series of tables by categories for girls and boys (24 tables); however, in analyzing the data it was revealed that on Inventory I the majority of girls, regardless of age (15-19) and boys (16-18) regardless of age, were predominantly "interested" in the items presented in Inventory I, and II, with a general increase in total interest by six on Inventory II, III, and IV. Hence, analysis by sex reveals no apparent sexual differentials in response, or

in consistency of testimony, and follows the same overall pattern as for the group as a whole, as presented in the previous section of this chapter. The analysis by sex corroborates the group analysis.

Individual Consistency of Testimony.--In analyzing the data on each respondents individual pattern of consistency for each of the items on the four inventories, it was revealed that there was no discernible pattern by which to evaluate the 33 individual patterns of response or testimony. That is, no consistent pattern emerged for any one individual for any specific item in any category. When subjected to age and sex factors no pattern emerged, nor did a pattern emerge in terms of whether the item dealt with comprehension, knowledge, analysis, and the like. Hence, a pattern of inconsistency emerged when an individual testimony for the 100 items was studied as individual testimony. In other words, on individual testimony of interest to items on the four inventories does not reduce itself to a pattern item by item, or in isolation from the total.

Further, the individual testimony does not reduce itself to a pattern when viewed in terms of categories. It only begins to assume meaning when all of the individuals responses are seen "as a whole" a "Gestalt" and then about all we can say about it is that individual one is more interested in X or Y than in C or Z. We cannot, therefore, predict or anticipate interest in a science area. And this appears, in this study, to be true regardless of the category, and regardless of the word count, synonym, problem, or salesmanship terms introduced.

CHAPTER III

Rationale.— For some time educators have been concerned with the problems involved in dealing with the subjective-objective attitudes, concerns, and/or conditions involved in precept or ideas formation as they influence attention, and their combination in intellectual and feeling consciousness. Rousseau and Pestalozzi are generally regarded as responsible for the doctrine of interest, later stated by Herbart, and espoused by DeGarmo and Dewey. This doctrine holds that the interests of the learner should be considered and utilized in determining both the content and the methods of instruction. In more recent years this doctrine of interest has been associated with the "needs approach" involving recognition of stages of development through which the individual passes in process of becoming mature, and the determination of materials and methods which are suitable for these several stages.

Many answers have been proposed to the questions of "what shall we teach" and "how shall we teach." These tend to reduce themselves to three: a) the vital needs of children/youth; b) society's need to preserve and pass on the social heritage; and c) the current social demands of society. It is believed, however, that a more comprehensive way of answering these questions demands: a) sound theory of culture and education built from direct study of contemporary civilization; b) dealing with the problem and conflicts of contemporary time and development of an adequate theory of social change; c) understanding the use of the

democratic value system; d) acceptance of intelligence and scientific method; e) building the potential of the society's institutions in terms of their changes; f) recognizing political-social-economic organizational needs; and g) inculcating desire to build the society creatively, imaginatively, and in terms of the intelligent application of science and its method for the democratic growth of man and his society.

Man differs from other animals in only a few ways. Opposition of the thumb to the fingers, migration of the eyes and consequent changes in vision and nerve endings, development of symbols and language, and resultant technological advances make it possible for man to use his language and tool-using skills to solve problems, and to create in immagination—to build and use thought models. Teachers concerned must therefore pattern the responses of pupils into meaningful figures not into isolated piecemeal reactions of skill and fact. In order to do this, the teacher must know that pupils are active, not passive; that pupils create their own meanings through their own responses, not from some hocus-pocus called teaching method or technique. For the unique potentialities and capacities of man are products of his neuro-muscular system which enables humans to relay and delay responses, to make discriminations in perception, to sense and hold direction of thought, to direct thought through perception and relation-seeing, to build thought models, and to generalize from insight and conceptualization.

A basic consideration, then, is that all behavior is directed towards need-satisfaction and the most effective way of changing, or inducing a change in behavior is to augment movements towards need-satisfaction. Hence, the foundation of teaching method lies in bio-social psychology, philosophy, and the esthetic orientation of pupils as teachers are aware

of these aspects. These postulations are based on the holistic principles of: 1) association; 2) active response; 3) the whole; 4) freedom; 5) anticipatory body response; 6) the perceptual field; 7) thinking-feeling foci; 8) problem solving as a thought process; 9) learning as a creative act.

From the days of the John Dewey Society and its later counterpart, the National Society for the Study of Education,[1] to the more recent publications of the Review of Educational Research, there has emerged an overwhelming amount of literature in support of the principles outlined above, and proposal to teach in these terms.

There are, then, ample bases in the literature for the position that science education should seek not only to make the everyday learning experiences interesting, but also seek to create in pupils abiding interests in science, and its methods, as a way of life and as a method for solving the problems of the democratic society.

Definitions - The Set of Terms.-- There are certain terms which are used extensively within the confines of this study. For the purpose of clarity, these terms are defined as follows:

1. Interest is excitement of feeling, accompanying special attention to some object; concern; also that which causes or holds such interest; power to interest.[2] Interest is not

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[1]The following yearbooks of the National Society for the Study of Education, The University of Chicago Press, are especially devoted to these areas: Thirty-third, Part II, The Activity Movement; Thirty-fifth Part I, The Grouping of Pupils; Thirty-seven, Part II, The Scientific Movement in Education; Thirty-eighth, Part I, Child Development; Thirty-ninth, Intelligence; Its Nature and Nurture; Forty-first, Philosophies of Education; Forty-third, Adolescence; Forty-fifth, Measurement of Understanding; Forty-sixth, Science Education in American Schools; Fifty- fourth, Adapting Secondary School Program to the Needs of Youth; Fifty-seventh, Integration of Educational Experiences.

[2]WNCD, Webster's New Collegiate Dictionary (Springfield: G. and C. Merriam Company, 1957), p. 439.

really a power or an entity which generates energy but a sympton. It is in brief, a sympton of a favorable adjustment of the worker to his work.[1] They (interests) indicate pleasure in the activity, and this, according to our analysis, also means relief from some irritant.[2] Interest is not some one thing; it is a name for the fact that a course of action, an occupation, or pursuit absorbs the power of an individual in a through-going way.[3]

The findings of our review of definitions indicate that the following definition of interest is most acceptable for purposes of this study:

> Interest is a subjective-objective attitude, concern, or condition involving a percept, or an idea in attention, and a combination of intellectual and feeling consciousness; it may be temporary or permanent; it may be based on native capicity, or conditioned by experience.[4]

2. Science refers to those systematically organized bodies of accumulated knowledge concerning the finite universe which have been derived exclusively through techniques of direct objective observation.[5] In this study, it will refer to experiences labeled "science" by eleventh grade students in the Meriweather

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[1]Arthur I. Gates, Psychology for Students of Education (New York: The Macmillan Company, 1933), p. 452.

[2]H. L. Hollingsworth, Educational Psychology (New York: D. Appleton-Century Company, 1933), p. 441.

[3]John Dewey, Interest in Effort in Education (Boston: Houghton Mifflin Company, 1913), p. 65.

[4]Carter V. Goode, The Dictionary of Education (New York: McGraw-Hill Company, 1945), p. 223.

[5]Sheldon J. Johnson, The Foundations of Science (Detroit: The Hamilton Press, 1957), p. 16.

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The Evolution of the Problem.— The use of student interest as a springboard to selection of content and teaching methodology is accepted by many educators. However, acceptance of this notion leaves many unanswered problems, and questions. What, exactly, is student interest? How is it discovered or identified? Can interests be measured? Is interest conditioned by sex, age, intelligence, geographical location? To what extent should interest operate as a determing factor in structuring the course of study?

During a period of several years as a science teacher it was observed that students exhibit varying degrees of interest in science. At the professional level it is increasingly held that science, and developing technology, has large impacts on society. It is also believed that the method of investigation called "scientific method" has implication for solving many of the personal and social problems in the contemporary society.

On the basis of these beliefs, preliminary exploration of the operations involved in using interest as a base for selecting content and method of teaching science led to perusal of literature published in this area. Participation in courses at Atlanta University further sponsored a desire to investigate the implications of an "interest approach" to improving science education.

The specific gap in knowledge, that is the unresolved difficulty encountered, lies in the need to develop precision in detecting and utilizing interest as a basis for selecting content and method. While many efforts have attempted to deal with these questions, more specific application in specific school situations will enable educators to deal

more effectively with this approach. There is in addition, a personal desire and need to develop proficiency in this approach by the investigator.

Contribution to Educational Knowledge, Theory or Practice.— It is believed that the data have the following possible contributions to education:

1. The study reveals significant and valuable indices of the areas of interest among the students studied, which may become one of the sources for selecting content and pedagogy.
2. The study provides another source for implementation of the "Georgia Science Guide" in a specific teaching-learning situation.
3. The study makes a contribution to the development and improvement of the science program in the school studied.
4. The study provides a base for subsequent studies which may deal with enexplored aspects not dealt with herein.

Statement and Definition of the Problem.— The basic problem of this study was to attempt to identify the science interests of eleventh grade pupils who are participating in the science education program of the Meriweather County Training School located at Manchester, Georgia. This problem demanded development of an instrument to identify the student's interests. Unsolved problems not dealt with in the proposed study included the extent to which the revealed or identified interests were precisely identified; the extent to which interests are a valid based for selecting content and method; development of techniques for evaluating specific interests; and production of materials specifically designed to satisfy student interest. These, and other problem remain to be solved

in this area of scientific investigation, and are specified and proposals for subsequent research explicated in the final chapter of the thesis.

Ultimate Objectives or Purposes of the Study.— Two interrelated major purposes conditioned the research: 1) Is the testimony of the pupils consistent or is it evanescent and changeable? Are the responses studied and reliable, or do they represent "map judgement?" 2) What are some of the factors in the situation which may predispose to the realization of divergent results? More specifically and corrolary propositions included the following purposes:

1. Are the results obtained significantly affected by the form of the item; for example, a tendency to select or reject items containing "salesmanship" terms or items stated in question form?
2. Are the items selected materially conditioned by the comparative word-difficulty of the items offered for selection?
3. Are "categories" of "interest" or relationship recognizable?
4. Are the sex and age differences reported by other studies observable?

It is recognized that other analyses might have been made. However, the present study was limited to the foregoing considerations.

The Research Procedure or Operational Steps.— The following steps were used in conducting this research:

1. The first step was to construct item-lists which were suggestive of the materials of science at least in one or more of their usages. These items were related to phases of science and to the Thorndike list of 30,000 words utilized to develop a basic

vocabulary.[1]

a) Operation one - The Taxonomy of Educational Objectives[2] was consulted.

b) Questions and Problems in Science: Test Item Folio No. 1 was used to build the instrument for identifying interest.[3]

c) The items, when compiled, were assembled into a single column using the Dressel-Nelson subject headings (30 headings) in the biological and the physical sciences (each of the items in the Dressel-Nelson listing is related to the Bloom Taxonomy).[4]

Column I	Column II
2. breathing	respiration
5. toxins	antitoxins
6. oceans	seas
8. climate	seasons
9. energy	power

Such grouping provided the basis for studying consistency of response.

3. The third step involved preparation of items as questions in

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[1]Edward L. Thorndike and Irving Lorge, Teachers Word Book of 30,000 Words (New York : Bureau of Publications, Teachers College, Columbia University, 1944).

[2]Benjamin S. Bloom, et al., Taxonomy of Educational Objectives (Prelimary ed.; New York: Longman's Green and Company 1954), p. 175.

[3]Paul Dressel and Clarence Nelson, Questions and Problems in Science (Princeton: Educational Testing Service, 1957), pp. 75, 81, 90-120.

[4]Clarence H. Nelson, Let's Build Quality Into Our Science Tests (Washington : National Science Teachers Association, National Education Association, 1958), p. 13

which the students were interested, and these were matched with the items in the first and second columns. This gave indication of whether or not the question or problem form of item intorduced a conditioning factor into the situation. (Effort to eliminate other conditioning factors consisted of using the Thorndike words in structuring the statements). Example:

Column I	Column II	Column III
2. breathing	respiration	How do we breathe?
5. toxins	antitoxins	Are toxins dangerous?
6. oceans	seas	How deep are seas
8. climate	seasons	What causes changed in climate?
9. energy	power	From what sources do we obtain power?

4. A fourth step consisted of preparing items incorporating "salesmanship" terms such as "dangers," "romance," "value," and the like. This was done to see if "naivete" was a conditioning factor. These items were matched to the other items. Example:

Column I	Column II	Column III	Column IV
2. breathing	respiration	How do we breathe?	The mystery of breathing
5. toxins	antitoxins	Are toxins dangerous?	Interesting facts about toxins
6. oceans	seas	How deep are seas?	The mysteries of seas
8. climate	seasons	What causes changes in climate?	The romance of the seasons
9. energy	power	From what sources do we obtain power	Strange facts about energy

5. The fifth step consisted of assembling the items into four final forms, after submission to a "jury" consisting of outstanding

science educators and other "experts." The items were then "scrambled matched items" was prepared, utilizing a "staggering" process. Thus, item 1, Column 1 (original designation) might become item 79, Form IV, et cetera. Each final form contained equal numbers of items from each of the original columns. Also, each item was represented in one of its four forms in each of the item lists.[1]

6. The sixth step proposed to present the four forms to the students within a period of eight weeks. This allowed a lapse of two seeks after administration of each form. Directions were identical on all item-lists. All testimony with respect to each item was recorded on specially designed data sheets, and scored.
7. The seventh step involved analysis for:
   a) Consistency of individual responses over a two month period on identical items
   b) Individual consistency at thirty minute intervals
   c) Group testimony regarding preference
   d) Shifting of testimony
   e) Factors influencing testimony according to:
      (1) Type of item
      (2) Sex
      (3) Word difficulty
      (4) Categories of interest

Locale of the Study.— The study was conducted in the Mariweather County Training School, Manchester, Georgia during the second semester

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[1]The forms of the "Inventories" contained in the appendix are the comparative forms and not those presented to students for response.

of the 1958-1959 school term. The subjects involved were the eleventh grade pupils enrolled in this school.

Summary of the Literature.— The literature reviewed was organized under two major captions: 1) literature pertaining to the philosophy and objectives of science education; and 2) literature pertaining to research on science interests.

Objectives and Philosophy of Science Education

Weaver indicates that four distinct eopchs have emerged in the teaching of science. These are: 1) the taxonomic, based on mental discipline and faculty psychology in which the emphasis is upon recognizing, classifying, and memorizing the individual facts of science; 2) the static-descriptive, based on early behavoristic psychology, in which the objectives dealt with static and morphological forms, still with emphasis on memorization and mastery of content; 3) the dynamic or analytical, based on dynamic psychology in which an effort is made to "fuse" and "blend" chemistry, physics, and/or biology; and 4) the holistic based on organismic and field theories of psychology, in which a unitary approach to all phenomena is made, with the main emphasis on inter-relationships and interdependencies of matter, energy, and change, and the evolution of an ecological view of all the phenomena in the universe.[1]

Bernal lends additional thought to this point of view by stating two specific objectives of science:

> The first objective is to provide enough understanding of the place of science in society to enable the great majority that will not be actively engaged in scientific pursuits to to collaborate intelligently with those who are, and to be

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[1]Edward K. Weaver, "Science and the Curriculum," School Science and Mathematics, LIX, No. 6 (February, 1959), p. 354.

> able to criticize or appreciate the effect of science on society. The second objective, which is not entirely distinct is to give practical understanding of the scientific method, sufficient to be applicable to the problems which the citizen has to face in his individual and social life.[1]

In the Forty-sixth Year book of the National Educational Association, a basic philosophy for science was proposed:

> Science is today on a plane of high significance and importance. It is no longer, if indeed it ever was, a mysterious and occult hocus-pocus to be known only to a select few. It touches, influences, and molds the lives of every living thing. Science teachers have the great opportunity and responsibility to make a large contribution to the welfare and advancement of humanity. The intellectual aspects of this responsibility are at least co-equal in importance with the material. Science is a great social force as well as a method of investigation. The understanding and acceptance of these facts will, more than anything else, make science teaching what it can and should be.[2]

There have been many general surveys in the field which have resulted in statements concerning the objectives and philosophy of science. These include reports from the Educational Policies Commission,[3] Harvard University,[4] The Commission on Reorganization of Secondary Education,[5] Science in General Education,[6] The American Council of Science Teachers,[7]

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[1] J. D. Bernal, "Science Teaching in General Education," Science and and Society, IV, No. 1(January, 1940), pp. 2-4.

[2] Science Education in American Schools, Forty-sixth Yearbook of the National Society for the Study of Education, Part I (Bloomington, Ill.: Public School Publishing Company, 1947), p. 39.

[3] Educational Policies Commission, Education for All American Youth (Washington: National Education Association, 1944)

[4] General Education in a Free Society (Cambridge: Harvard University Press, 1945), p. 155.

[5] Report of the Commission on Reorganization of Secondary Education - Subcommittee on the Teaching of Science, Bulletin No. 36 (Washington: U. S. Bureau of Printing, Office Education).

[6] Science in General Education (New York: D. Appleton Century, 1958).

[7] The Education of the Science Teacher, A Report of the National Committee on Science Teaching, The American Council on Education, and the National Education Association (Washington, 1942).

and the National Committee on Science Teaching.[1] These reports generally agree on the basic objectives and philosophy in terms of: a) functional information or facts; b) functional concepts; c) functional understanding; d) instrumental skills; e) problem-solving skills and abilities; f) attitudes; g) appreciations; and h) interests.

The literature is generally agreed that science educators have some to think that the more important things to aim at in science courses are such things as understanding what science is about and knowing how scientists go about their work, rather than material knowledge alone. The goal of showing what science is, what scientific procedure is like, and what scientists are like is now seen to be the most real, and perhaps the most important thing, in science education.[2]

Summary.— The instrument used in this study to determine the students' Interest Inventory prepared by the National Science Teachers Association. The inventory is divided into four sections, with each section containing one hundred items. Each of the four sections is further divided into ten content areas and each area has ten items. The items are arranged so as to determine the student's knowledge of subject matter, comprehension of subject matter, application of subject matter, and analysis of subject matter. Moreover, the items in the inventory were arranged to test for the consistency of the students' responses to the items in the inventory.

The Teacher's Word Book of 30,000 Words by Thorndike and Lorge were used to ascertain whether the students' vocabulary would have any bearing

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[1] Redirecting Science Teaching in the Light of Personal-Social Needs, A Report of the Natl. Committee on Science Teaching (Washington: Natl. Education Association, 1942).

[2] Science Education in American Schools, op cit., p. 4.

on their responses. The results of the responses revealed that the words used in the Science Interest Inventories were well within the students' vocabulary range. The data showed that the consistency of response of students to the items was evident in terms of the individual and overall group. Of the total number of items on the inventories only thirty-one items showed instances of wide variations.

An anslysis of responses of boys and girls showed no apparent sexual differentials in response. The type of responses made by boys and girls to the items on the Science Interest Inventories were approximately the same. Age, the data showed, seemingly had no influence on the types of responses made to the individual items on the Science Interest Inventories.

Summary of Findings.— The findings, based on the data collected, are presented under: 2) caption; a) The word difficulty (count) of the basic words used in the inventories; and b) consistency of response by categories.

A. The Word Difficulty of the Inventories

1. An intensive analysis of the word difficulty (count) of the basic words utilized in the inventories revealed that the vast majority of the words were one or more grades below the subjects grade, and indicated that the inventories, according to the lists used, should have been able to understand the word meanings. All of the words used were within the first 15,000 words which occur most frequently.
2. The subjects revealed that they possessed vocabularies beyond their anticipated vocabulary level.

B. Responses by Categories

1. Category I - Methods of Science

The overall average consistency of testimony for category I reveals a relatively high interest.

a. The subjects interests were high on items of knowledge in this category.

b. The subjects interests were high on items of comprehension in this category

c. The subjects interests were high on items of analysis in this category.

d. This category ranked higher in terms of interest than the other nine, with an average decile rank of 8.95.

2. Category II - Minerals and Rocks

The overall average consistency of testimony for category II reveals a relatively high interest.

a. The subjects interests were fairly high on items of knowledge in this category.

b. The subjects interests were relatively high on items of comprehension in this category.

c. This category ranked sixth highest in terms of interest than the other eight, with an average decile rank of 8.4.

3. Category III - Changes in Land Feasures

The overall average consistency of testimony for category III reveals a relatively high interest.

a. The subjects interest were fairly high on items of knowledge in this category.

b. The subjects interest were relatively high on items of comprehension in this category.

c. The subjects interests were relatively high on items of application in this category.

d. This category ranked seventh highest in terms of interest than the other seven, with an average decile rank of 8.4

4. Category IV - Interpretation of Land Features

The overall average consistency of testimony for category IV reveals a fairly high interest.

a. The subjects interests were fairly high on items of knowledge in this category.

b. The subjects interest were fairly high on items of comprehension in this category.

c. The subjects interests were fairly high on items of application in this category.

d. This category ranked tenth in terms of interest than the other 6, with an average decile rank of 7.7.

5. Category V - Animal Classification

The overall average consistency of testimony for category V reveals a high interest.

a. The subjects interest were high on items of knowledge in this category.

b. The subjects interest were relatively high on items of comprehension in this category.

c. The subjects interests were relatively high on items of application in this category.

d. This category ranked fifth highest in terms of interest than the other five, with an average decile rank of 8.6.

6. Category VI - The Plants of the Earth

The overall average consistency of testimony for category VI reveals a relatively high interest.

a. The subjects interest were fairly high on items of knowledge in this category.

b. The subjects interest were relatively high on items of comprehension in this category.

c. The subjects interest were relatively high on items of application in this category.

d. This category ranked ninth highest in terms of interest than the other four, with an average decile rank of 8.3.

7. Category VII - Populations and The Mechanisms of Evolution

The overall average consistency of testimony for category VII reveals a relatively high interest.

a. The subjects were fairly high on items of knowledge in this category.

b. The subjects interest were relatively high on items of comprehension in this category.

c. The subjects interest were relatively high on items of analysis in this category.

d. This category ranked fourth highest in terms of interest than the other three, with an average decile rank of 8.7.

8. Category VIII - Variation and Selection

The overall average consistency of testimony for category VIII reveals a relatively high interest.

a. The subjects interest were fairly high on items of comprehension in this category.

b. The subjects interest were relatively high on items of application in this category.

c. The subjects interest were relatively high on items of analysis in this category.

d. This category ranked eighth highest in terms of interest than the other two, with an average decile rank of 8.4.

9. Category IX - Facts of Evolution and the Theory that Explain Them

The overall average consistency of testimony for category IX reveals a relatively high interest.

a. The subjects interest were relatively high on items of comprehension in this category.

b. The subjects interest were relatively high on items of application in this category

c. The subjects interest were relatively high on items of analysis in this category.

d. This category ranked second highest in terms of interest than the final one, with an average decile rank of 8.8.

10. Category X - Evolution, Genetics, and the Races of Man

The overall average consistency of testimony for category X reveals a relatively high interest.

a. The subjects interest were relatively high on items of comprehension in this category.

b. The subjects interest were relatively high on items of application in this category.

c. The subjects interest were relatively high on items of analysis in this category.

d. This category ranked third highest in terms of interest. with an average decile rank of 8.8

11. Out of 100 items which appeared on each Inventory, a total of 31 instances of wide deviation appeared. Again in these specific instances, as for the group, the factors which appeared to occasion the range and deviation in interest were most strikingly revealed in Inventory I and decreasingly so in the other Inventories.
12. Boys and girls showed no apparent sexual difference in consistency of testimony.
13. The interests of boys and girls, according to age, showed no apparent differences.
14. Interests were consistently highest on items pertaining to knowledge; somewhat lower on items pertaining to comprehension, lower on items pertaining to application, and lowest on items pertaining to analysis.
15. The respondents, generally maintained a relatively high interest in all categories.
16. Individual testimony did not materially vary from group testimony.

Conclusions.— The data warrant the following conclusions:

1. The consistency of testimony, in general, was not materially conditioned by the comparative word diffuculty of the items offered for selection.
2. Generally, the introduction of synonyms appeared to be a useful factor in establishing consistency of testimony.
3. The results obtained were not significantly affected by the form of the items containing "salesmanship" terms or items stated in question or problem form.

4. Categories of interest were recognizable with a tendency for interest to be higher in knowledge areas, lower in comprehension areas, lower in application areas, and lowest in analysis area.
5. Sex and age were not factors influencing testimony.
6. The respondents testimony was relatively high and stable.
7. The findings of this study vary markedly from that of previous studies.

Implications.— The conclusions appear to warrant the following implications:

1. The high level of interest and consistency of testimony during the period of this study warrants the proposal that students interest be utilized as a base for selecting the materials of the science learning experiences.
2. The remarkable deviation in the findings of this study and from previous studies, in this area may be attributed to difference in research design, and in the utilization of more scientific bases for constructing the interest Inventories.
3. The utilization of the Taxonomy of Educational Objectives and the Test Folio of Questions and Problems in Science may be useful to teachers in structuring courses of study.
4. The technique used in this study may be useful in determining course content in science in other schools.

Recommendations.— The following recommendations appear appropriate, that:

1. In view of the remarkable differences in the findings of this

study as compared with previous studies, it is proposed that similar studies, using a similar design, but a longer period, be conducted, and at the various grade levels.

2. The Meriwether County Training School engage in an experiment in which the science interests of the students are utilized to structure the courses in science.

APPENDIX

SCIENCE INTEREST INVENTORY

FORM I

Please place o if you are not interested in this area; I/ if you are interested; I/I/ if you are very interested; and draw a line through the area if you "don't care."

I/=interested; I/I/=very interested; o=not interested; ----=don't care.
BE SURE AND MARK EACH SPACE IN THE LIST BELOW

_____Earth's axis
_____Evaporation
_____Erosion
_____Longitude
_____Vertebrates
_____Molds
_____Competition among animals and plants
_____Symbiosis
_____Food
_____Heidelberg Man
_____Climate
_____Condensation
_____Glaciers
_____Latitude
_____Invertebrates
_____Fungi
_____Malthus & Overpopulation
_____The Food Chain
_____Birth-Death rates
_____Java-Man
_____Horizon
_____Igneous
_____Volcanoes
_____Streams-Rivers
_____Birds
_____Mosses
_____Artificial selection
_____Recessive genes
_____Survival of the species
_____Peking-Man
_____Revolution of the Earth
_____Sedimentary Rock
_____Weathering
_____Atmospheric conditions
_____Mammals
_____Yeasts

_____Biotic Potential
_____Inheritance of hair texture
_____Gravity
_____Cleavage of rocks
_____Sand dunes
_____Coastal regions
_____Fish
_____Monocotyledons
_____Modification of inherited characters
_____Domestication of animals & plants
_____Sterilization
_____Inheritance of intelligence
_____The seasons
_____Boulders
_____Mountain formation
_____Magma
_____The Plant and Animal Phyla
_____The Conifers
_____Parasitism
_____The predators
_____Twins-Triplets-Quadruplets-Quintuplets
_____The Sun
_____Minerals
_____Rivers and their work
_____Earth fractures
_____Respiration
_____Stomata
_____Ecology
_____Mimicry
_____Eugenics
_____Fossils
_____Copernicus
_____Animal and plant remains
_____Loess
_____Islands

SCIENCE INTEREST INVENTORY-Continued

FORM I

_____Inbreeding
_____Sex-linked characters
_____Natural selection
_____Inheritance of skin-color
_____Rotation of the Earth
_____Metamorphic Rock
_____Durability of land features
_____Peninsulars
_____Reptiles
_____Bryophytes
_____Adaptation in plants and animals
_____Hybrids
_____Common ancestors of man
_____Euthenics
_____Digestion
_____Thallophytes
_____Saprophytes
_____The influence of the environment
_____Population curves
_____Caucasians
_____Origin of the Earth
_____Diastrophism
_____Earthquakes
_____Meredian and Time
_____Pteridophytes
_____Homology
_____Negroes
_____Survival of the fittest
_____Health

Please write your name below.

Please place your age.

SCIENCE INTEREST INVENTORY

FORM II

Please place o if you are not interested in this area; I/if you are interested; I/I/ if you are very interested; and draw a line through the area if you "don't care."

I/=interested; I/I/=very interested; o=not interested; ----="don't care"

BE SURE AND MARK EACH SPACE IN THE SPACE BELOW

_____World's base
_____Dehydration
_____Deterioration
_____Mileage
_____Backbone
_____Mildew
_____Rival between beast & herbs
_____Sembiotic relations
_____Eats
_____Pre-Historic Man
_____Weather
_____Shrinking
_____Ice
_____Diameter
_____Without backbone
_____Bacteria
_____Political economist and increase in birth-rates
_____Chow train
_____Childbirth-decease tax
_____Human remains of Malay
_____Range
_____Heat formed rocks
_____Mountains
_____Currents-rapids
_____Fowls of the air
_____Parasitic fungi
_____Synthetic preference
_____Receded heritage
_____Remains of the class
_____Human fossils of China
_____Rotation of the universe
_____Residue stones
_____Tornados
_____Air situation
_____Life dormant
_____Heritage of hornylike threads
_____Force
_____Anatomy of stones
_____Desert mounds
_____Beach region
_____Aquatic animals
_____Seeds plants
_____Variation of heredity symbols
_____Taming of beast and shrubs
_____Birthright of intelligence
_____Alternation
_____Roundness
_____Volcanic erection
_____Lava
_____Vegetable & beast division
_____Cone bearing plants
_____Leech
_____The kidnappers
_____Couples-trios-quartets-cinques
_____Center of the universe
_____Minerology
_____Running water and its labor
_____World fissures
_____Breathing
_____Classification
_____Mutual relations
_____Mockery
_____Botterment
_____Remains
_____Beast & vegetable residue
_____Clay
_____Islet
_____Absorption
_____Fungi plant

SCIENCE INTEREST INVENTORY-Continued

FORM II

_____Beast
_____Ferment
_____Breeding within
_____Male connected symbols
_____Inartificial choice
_____Heritage of hide tint
_____Turning of the satellite
_____Transformating stones
_____Permanent shore scene
_____Continents
_____Snakes
_____Trees
_____Adjustment of shrubs and beast
_____Mixtures
_____Gen.forefathers of human race
_____Improvements
_____Mushroom
_____The effect of the background
_____Generation arch
_____Classes of people
_____Beginning of the universe
_____Deformed earth
_____Tremble of the earth
_____Region and opportunity
_____Flowerless plants
_____Equality
_____Free of germs
_____Revolution of planets
_____Ebony
_____Remains of the adaptable
_____Hearty

Please write your name and age below.

Name:_____Age:_____

SCIENCE INTEREST INVENTORY

FORM III

Please place o if you are not interested in this area; I/ if you are interested; I/I/ if you are very interested; draw a line through the area if you "don't care."

I/=interested; I/I/=very interested; o=not interested; ----="don't care"

BE SURE AND RANK EACH SPACE IN THE LIST BELOW

_____What planets are in our solar system?
_____What causes evaporation?
_____How does running water affect the soil?
_____How is distance measured?
_____What are some vertebrate animals?
_____What causes molds?
_____Do organisms have the urge to live?
_____What is mutual relations?
_____What is a correct diet?
_____How did cavemen live?
_____What causes changes in climates?
_____What causes cells to shrink?
_____What is a glacier?
_____What is the diameter of the earth?
_____What are some invertebrate animals?
_____What is the nature of bacteria?
_____Who was Malthus?
_____What is the food cycle?
_____What causes the population to increase?
_____What are the races of Pre-Historic Man?
_____What is horizon?
_____Are igneous rocks very hard?
_____What causes lava to flow?
_____In what major direction do rivers flow?
_____How do birds live?
_____What are parasites?
_____What is parthenogenesis?
_____What is an albino?
_____What pre-historic organism still exist?
_____How are fossils formed?
_____How fast does the earth rotate?
_____What materials are stones made of?
_____How can we forecast weather conditions?
_____What is air composed of?
_____What are mammals?
_____Why does bread rise?

SCIENCE INTEREST INVENTORY-Continued

FORM III

_____What is self-pollination?
_____What is the male chromosome?
_____How does nature provide?
_____What causes skin color?
_____In what direction is the earth turning?
_____How are soils formed?
_____Where do ships load?
_____What are the continents?
_____Are all snakes poisonous?
_____How do trees grow?
_____What is adaptation?
_____What is a mixture?
_____What is evolution?
_____How can the human race be improved?
_____What is biology?
_____How do we inherit hair type?
_____What is gravity?
_____How are stones constructed?
_____What are oasis?
_____Do all beaches contain sand?
_____What animals live in the deep sea?
_____How are seeds made?
_____Are all individuals different?
_____How can animals be tamed?
_____How do we think?
_____What causes seasons to change?
_____How are boulders designed?
_____When is a volcano active?
_____Where does lava come from?
_____How are plants and animals classified?
_____What are some cone bearing plants?
_____Are leech bloodsuckers?
_____Does crime pay?
_____Do twins come from the same egg?
_____What is the relation of the earth to the solar system?
_____What minerals are essential for life?
_____How are deltas formed?
_____What causes large cracks in the earth?
_____How do we breathe?
_____How are organisms classified?
_____Are harmonious relations necessary?
_____Is mockery an art?
_____How can future generations be improved?
_____Where do we find most fossils?
_____What is formed when organisms decay?
_____How is clay distinguished?
_____Where is the islet of Langerhans located?
_____How do we use food?
_____Where do fungi plants grow?
_____Are mushrooms safe to eat?

SCIENCE INTEREST INVENTORY-Continued

FORM III

_____What is environment?
_____Are more people being borned?
_____What are the classes of peoples?
_____How was the earth formed?
_____What is diastrophism?
_____What causes the earth to tremble?
_____How is time measured?
_____What are flowerless plants called?
_____Are all things made equal?
_____What are germs?
_____How many planets are in our solar system?
_____What is pigmentation?
_____How do organisms protect themselves?
_____How can we remain healthy?

Please place your name below. Age.

SCIENCE INTEREST INVENTORY

FORM IV

Please place o if you are not interested in this area; I/ if you are interested; I/I/ if you are very interested; and draw a line through the area if you "don't care."

I/=interested; I/I/-very interested; o=not interested; ---="don't care."

_____The story of the earth's axis
_____The amazing reason for evaporation
_____The destructive results of erosion
_____The ways of measuring distance
_____The purpose of the backbone
_____The mystery of mildew
_____The story of animal and plant life
_____Strange tales of relationship
_____The truth about foods
_____The fascinating story about Java-Man
_____Interesting facts about weather
_____The ability of some liquids to condense
_____The romance of the glacial age
_____The diameter of the world
_____Some unusual vertebrates
_____Amazing facts about bacteria
_____The life of a political economist
_____The mystery of the food cycle
_____The high rate of mortality
_____The mysterious animals of the past
_____Facts about horizon
_____Remarkable facts about igneous rocks
_____Dangers of volcanoes
_____The work of meandering streams
_____Strange stories about birds
_____The dangers of parasites
_____Purposes of breeder's choice
_____The results of recessive genes
_____The remains of pre-historic organisms
_____The findings of fossils in China
_____The wonders of the universe
_____Interesting facts about stones
_____The startling effects of tornados
_____The layers of the atmosphere
_____Familiar viviparous
_____The mystery of yeasts
_____The usual results of inbreeding

SCIENCE INTEREST INVENTORY-Continued

FORM IV

_____The significance of sex-linked genes
_____The selection by nature
_____Genes responsible for skin-color
_____Causes of earth rotation
_____Work of nature in transformating stones
_____The advantage of docks for loading
_____Remarkable facts about the continents
_____Dangers of some snakes
_____The romance of forestry
_____Adjustment of organisms to their environment
_____The components of a mixture
_____The tremendous racial changes of the past
_____Practical information about earthquakes
_____The story about plants and animals
_____The miraculous work of genes for hair
_____Astounding facts about gravity
_____Geological knowledge of rock structure
_____The mystery of oasis
_____Amazing reasons for sand formation
_____Unusual animals of the deep sea
_____The fascinating story of seeds
_____The results of cross-breeding
_____The art of domesticating animals
_____The mystery of intelligence
_____The romance of the seasons
_____Practical geometric figures
_____The dangers of volcanoes
_____The composition of lava
_____The method of catagorizing plants and animals
_____Fascinating facts about conifers
_____How leech became bloodsuckers
_____The shocking story thieves in the night
_____The truth about human reproduction
_____Amazing facts about the universe
_____The values of minerals
_____Some outstanding works of rivers
_____The results of earth's faults
_____The mystery of breathing
_____The reasons of classification
_____The necessity of mutual relations
_____Some talented mimics
_____Some practical examples on population improvements
_____The mysterious animals of the past
_____The amazing results of chemical changes
_____The remarkable history of soils
_____The tales of floating islands
_____Conversion of food materials
_____Fascinating facts about fungi plants
_____Practical knowledge about mushrooms
_____The remarkable conditions of life

SCIENCE INTEREST INVENTORY-Continued

FORM IV

_____The increased world population
_____The origin of racial classes
_____The mysterious creation of the earth
_____The shocking results of diastrophisms
_____The disastrous results of earthquakes
_____Techniques of measuring time
_____Many varities of vegetables
_____Inherited inequalities of mankind
_____Strange facts about microbes
_____Useful knowledge about planets
_____The natives of Africa
_____The adaptation of organisms to their environment
_____Startling results of human disease

Please place your name and age below.

Name:_____ Age:_____

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